TECHNOLOGY DEPARTMENT

32nd Year

JULY, 1948

# RUBBER AGE

JUL 28 1948


## SETSIT-5

### LATEX ACCELERATOR

**for** ..... Natural, GR-S, Neoprene, and Buna N latices and reclaim dispersions.

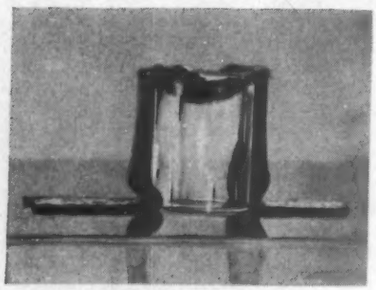
**easy to mix** ..... SETSIT-5 is a liquid and may be diluted with an equal volume of water and stirred directly into the latex compound.

**ultra fast** ..... SETSIT-5 accelerates the cure of natural and GR-S latices rapidly at either high or low curing temperatures.

**good properties** ..... SETSIT-5 develops very high tensile strength with good aging in natural and GR-S latices. Goods made from SETSIT-5 accelerated Neoprene latex have outstanding modulus and aging.

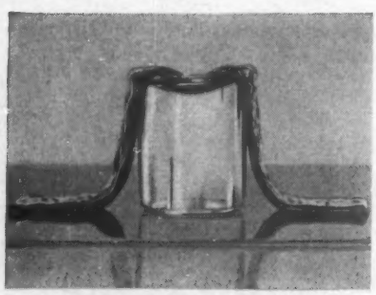
TABLE 1

| Compound | A | B | C |
|---|---|---|---|
| Neoprene GR-M-10 | 100.0 | 95.0 | 90.0 |
| Neoprene Type S | | 5.0 | 10.0 |
| NEOZONE D | 2.0 | 2.0 | 2.0 |
| HELIOZONE | 2.0 | 2.0 | 2.0 |
| Stearic Acid | 0.5 | 0.5 | 0.5 |
| Extra Light Calcined Magnesia | 4.0 | 4.0 | 4.0 |
| Fine Thermal Carbon Black | 10.0 | 10.0 | 10.0 |
| Light Process Oil | 15.0 | 15.0 | 15.0 |
| Sulphur | 1.0 | 1.0 | 1.0 |
| NA-11 | 1.0 | 1.0 | 1.0 |
| Zinc Oxide | 5.0 | 5.0 | 5.0 |



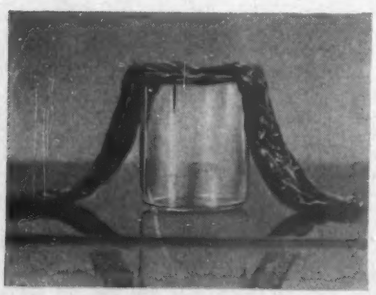
COMPOUND A

Neoprene GR-M-10 . . . . 100



COMPOUND B

Neoprene GR-M-10 . . . . 95
Neoprene Type S . . . . . 5



COMPOUND C

Neoprene GR-M-10 . . . . 90
Neoprene Type S . . . . . 10


## Improve processing of neoprene stocks with

# NEOPRENE Type S

- Produces firmer uncured stocks
- Reduces rate of mill breakdown
- Minimizes sticking to mill and calender rolls

There are many processing difficulties which can be overcome by the use of small amounts of Neoprene Type S. For example, the low durometer stock described in the table is extremely difficult to handle if GR-M-10 alone is used. But notice in the photographs how a small amount of Type S improves the stock. The compound is definitely firmer . . . shows less plastic flow. And no other changes are necessary in the formula because Type S does not change the properties of the vulcanizate.

The increased firmness of stocks containing Type S means less difficulty in mixing and calendering; reduces deformation of uncured molding slugs; produces higher back pressures in molding; makes possible the use of high softener ratios with fewer processing difficulties.

For suggestions and details on this use of Neoprene Type S, see Report BL-225, "Neoprene Type S as a Processing Aid in GR-M and GR-M-10 Compounds." Extra copies are available. Write to Rubber Chemicals Division, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

*Du Pont* "CAVALCADE OF AMERICA" *returns to the air Monday, September 13—NBC network*

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DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY



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# TWO NEW PLASTICIZERS FOR VINYL RESINS

PUBLIC LIBRARY
JUL 28 1948
DETROIT

## New Hycar Nitrile Polymers make processing easier and widen fields for makers of many products

THIS news is important to any company dealing in any way with the vinyl resins. The new Hycar EP (easy processing) and Hycar NS (easy-processing, non-staining) offer exceptional advantages. These are nitrile rubbers that really *blend* with the vinyls. Check these properties:

★ **PERMANENT CEMENTABILITY**—because these plasticizers are non-migrating and non-volatile. (Of vital interest to any manufacturer of products requiring cemented construction.)

★ **STABILITY**—won't get brittle, won't evaporate.

★ **NON-MIGRATING**—won't soften or pick up varnish.

★ **EASY PROCESSING**—and a more perfect blend either on a mill or in a Banbury. Calenders and extrudes *smoothly*.

★ **HIGHER LOADING**—economy in products where the price per pound of the compound is important.

★ **WIDER LATITUDE**—in color and color stability, particularly with those hard-to-do pastels.

Our service bulletin, 48-H1, on the use of the new Hycar American Rubber with the vinyl resins, will be sent on request. We make no finished products from Hycar or any of our other raw materials, but we are glad to help in the development work on any special applications. Write Dept. HB-7, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

**Hycar**
Reg. U. S. Pat. Off.
*American Rubber*

**B. F. Goodrich Chemical Company**
A DIVISION OF THE B. F. GOODRICH COMPANY

**GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals**

# OH BOY!

## GET A LOAD OF THIS!

Philblack A has a load of advantages to offer! Here are just a few of the benefits he brings to manufacturers of tires.

Tires made with Philblack A have extremely low heat build-up. And they have good tensile strength and modulus, even at high temperatures. They resist cut and crack growth. Yes, tires made with Philblack A roll up impressive mileages!

That's why so many tire manufacturers are using Philblack A. You will like the results you get using Philblack A in *your* rubber products!

**PHILLIPS PETROLEUM COMPANY**

*Rubber Chemicals Division*

EVANS SAVINGS AND LOAN BUILDING · AKRON 8, OHIO

# "Black Magic" finds an equal...

Photo courtesy Lamb Rubber Co.

## . . . and in Hycar alone, this combination of characteristics

"Black Magic" is an oil-base drilling mud, used to counteract earth pressures and to lubricate in oil well drill miles underground. Hycar is a chemically designed rubber made to resist oil.

The man in the picture is showing you a pipe protector made by the Lamb Rubber Company for this operation. It is made of Hycar American Rubber and for very certain reasons. First, the protector has to be stretchable—for a 4-inch protector must pull over a 7-inch joint. But it must be resilient, too, so it hugs the pipe by its own natural strength. But that's not enough! Deep drilling means temperatures of 285 degrees F. and better—so the pipe protector must be resistant to heat. Most important of all, however, is the fact that it must protect metal from abrasion and therefore be many times more abrasion-resistant than metal itself. Lamb tried many materials—settled on Hycar.

So count them: parts made of Hycar are oil-resistant, heat-resistant, abrasion-resistant—resilient, strong and able to stand up under wear. How many materials do you know that combine so many characteristics—and we haven't said yet how Hycar can be compounded so as to be non-staining, easy-processing and take any color of the rainbow you want to give it! We've told you about its use in oil wells only because you, yourself, might get some ideas about parts or products where Hycar American Rubber will do it better. It's used as an adhesive in many fields, as an impregnant for paper and cloth—and for a list of useful items as long as your arm.

**Hycar**
Reg. U.S. Pat. Off.
*American Rubber*

We make no finished products from HYCAR—or from any other B. F. Goodrich Chemical Company raw materials. However, we'll be glad to work with you on any special problems or applications. For more information, write B. F. Goodrich Chemical Company, Dept. R-7, Rose Building, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

**B. F. Goodrich Chemical Company**
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**GEON polyvinyl materials • HYCAR American rubber • KRISTON thermosetting resins • GOOD-RITE chemicals**

Good-rite
VULTROL
for use in American rubber compounding
to prevent scorching, and for recovering
scorched stocks
GOOD RITE AND VULTROL REG T M U S PAT OFF

*For technical data please write Dept. CB-7*

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**ROSE BUILDING, CLEVELAND 15, OHIO**

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Heavy-duty Mills, in all sizes up to 84 inches, featuring extra heavy construction, smooth operation, and long life.

Laboratory Mills furnished with built-in motor, control and adjustable speed drive. Entirely enclosed ready to operate. Mechanism is readily accessible.

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Presses for compressing, transfer molding, laminating, and polishing. All sizes and types. Custom built.

TO INCREASE PRODUCTION — and therefore profits — you should choose EEMCO. Here is a line made in a factory with more than 30 years experience in Rubber and Plastic machinery. EEMCO operates its own modern foundry and machine shop, and has every facility including a large stock of motors, controls, and necessary component parts to insure quick delivery. Choose EEMCO for correct design and sturdy dependability. Built for heavy duty and long life, EEMCO saves time and money. Currently, EEMCO is making exceptionally fast deliveries. Write today for quotations.

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RUBBER AND PLASTICS MACHINERY DIVISION

# Flash!!

# PLAX POLYETHYLENE SOLVES RUBBER BACKING PROBLEMS!

**COSTS 50% LESS . . . BOON TO INDUSTRY**

## Technical DATA

| | | |
|---|---|---|
| MECHANICAL | Tensile Strength psi | 1700-1900 |
| | Flexural Strength psi | 1500-1700 |
| | Impact Strength Izod ft lbs/in notch | > 3 |
| | Rockwell Hardness | R-25-R-35 |
| | Elongation % | 50-600 |
| PHYSICAL | Specific Gravity | .92 |
| | Specific Volume cu. in/lb. | 30.1 |
| | Water Absorption 24 hours. % | < .005-01 |
| | Effect of Sunlight | No discoloration |

| | | | | | | |
|---|---|---|---|---|---|---|
| STD. GAUGES | .001 | .0015 | .002 | .0025 | .003 | |
| | .004 | .008 | .010 | .015 | .020 | .030 |

Intermediate Sizes as Requested

**PLAX Polyethylene Film Comes in Sheet Form**

1000 ft. and 2000 ft. rolls 36" or 40" wide. Wound on 3" cores. Standard colors in opaques and pastels available. Rolls slit to width subject to quotation.

***Polyethylene Sheet is Better...Less Expensive! Polyethylene, Backing for Camelback, is a Plax Engineered Product!***

**This newest plastic development is a revolutionary improvement over products now in use and is employed and endorsed by many of the largest rubber companies in America. With its unique wax-like texture, and resistance to water, acids and alcohol, it is the preferred, highly efficient protection for all types of rubber products. Polyethylene produces a high surface gloss, will not flake or tear, is seamless and of uniform caliper. It's tough, chemically inert, heat-sealable. Excellent for packaging rubber products!**

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*One of the products for the Rubber Industry*

from

**CADILLAC PLASTIC CO.**

**651 W. Baltimore • Detroit 2, Michigan**

# For Better Wire Insulation use PLIOLITE S-6

## ELECTRICAL PROPERTIES OF PLIOLITE S-6

*Specific Volume Resistivity, ohm-cm x $10^{16}$ = 35*
*Specific Surface Resistivity, ohm x $10^{16}$ = 6*

| Dielectric Constant | 1,000 cycles | 1,000,000 cycles | 60,000,000 cycles |
|---|---|---|---|
| | 2.52 | 2.60 | 2.5 |
| Power Factor, % | 0.045 | 0.051 | 0.9 |

THE above chart shows the excellent electrical properties of **PLIOLITE S-6.** It helps explain why this unique reinforcement is so well suited to use in wire insulation and other products where electrical resistance is required.

**PLIOLITE S-6** offers these other important advantages in electrical insulation stocks:

*It reinforces GR-S and Buna N, increasing tensile, elongation, hardness, stiffness, tear resistance and flex-life.*

*It stiffens and hardens natural rubber.*

*It improves the oven-aging of natural rubber.*

*At elevated temperatures it acts as a plasticizer for synthetic and natural rubber to improve* processability *and reduce* shrinkage.

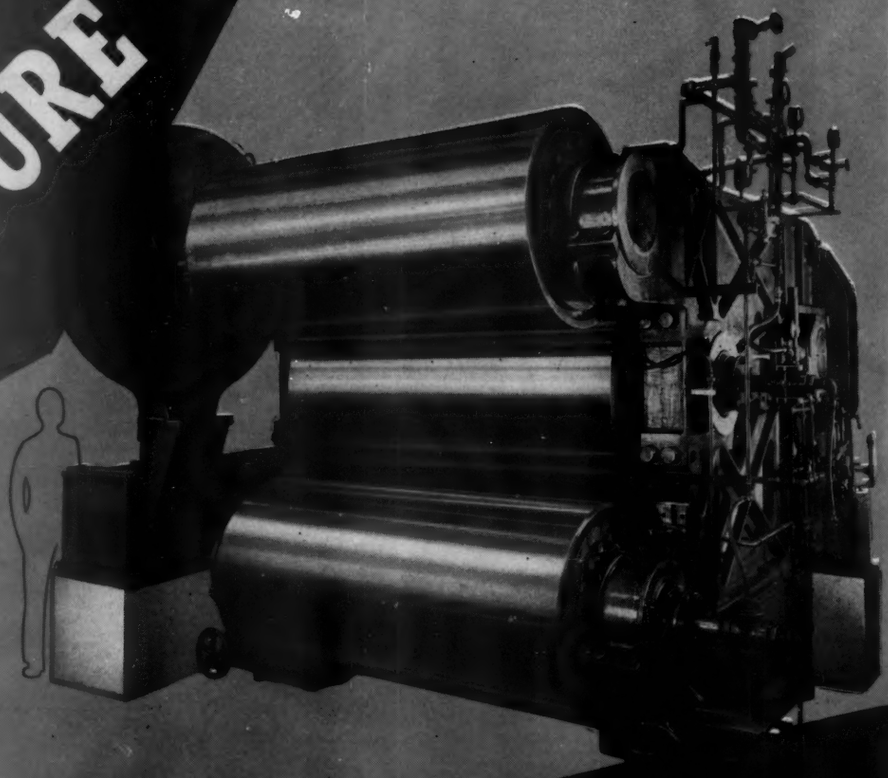
*It can be mixed directly in the Banbury.*

**PLIOLITE S-6** is available as a powder for your own mixing, or in master batches in whatever rubber you select. For complete information and sample, write: Goodyear, Chemical Products Division, Plastics and Coatings Dept., Akron 16, Ohio.

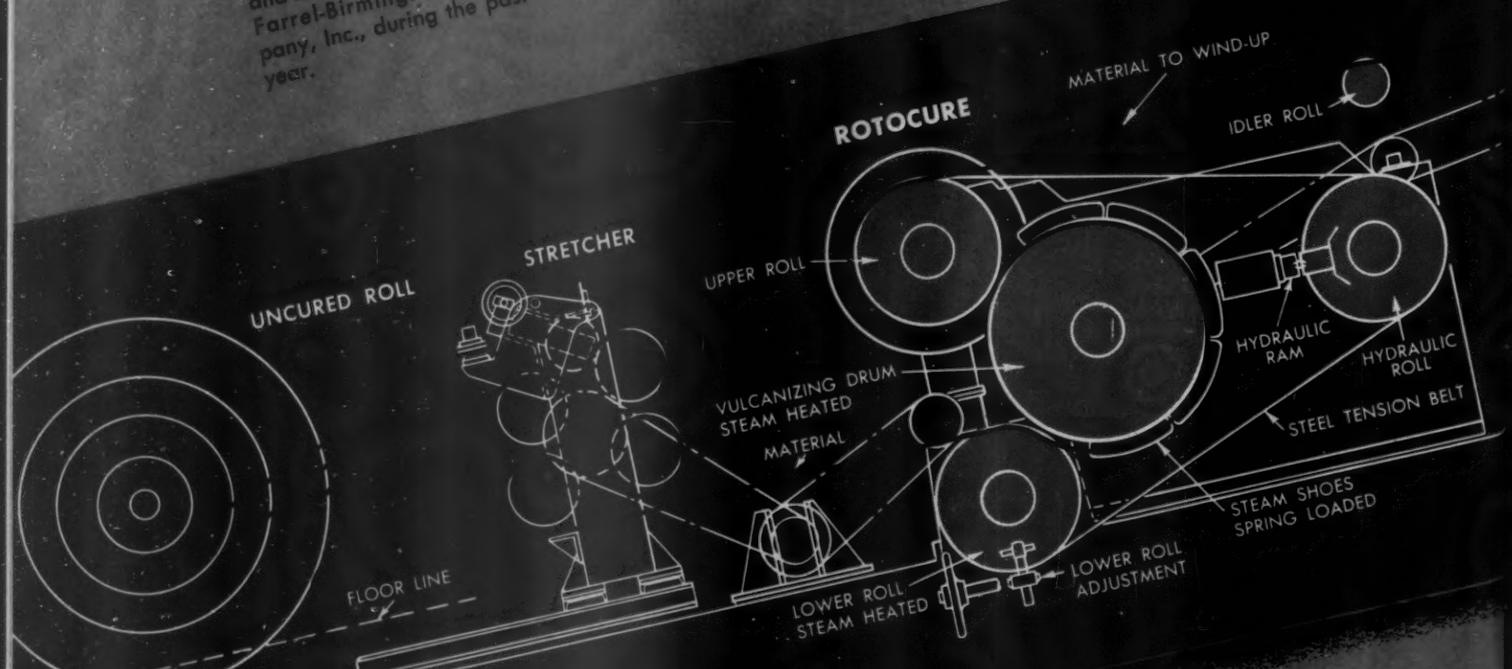
Pliolite—T.M. The Goodyear Tire & Rubber Company

GOODYEAR

# THIS IS THE ROTOCURE®



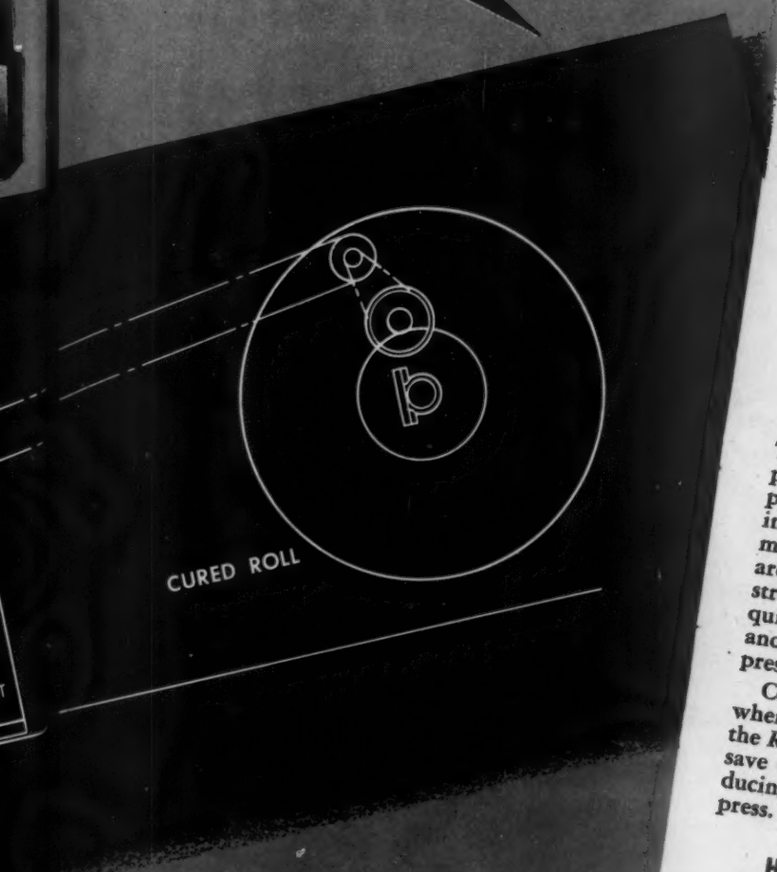
The Rotocure is a patented machine built under license from Boston Woven Hose & Rubber Co. The machine illustrated is 80" face width, and is one of seven built by Farrel-Birmingham Company, Inc., during the past year.




FARREL CENTENNIAL 1874 1974

Farrel-

# FOR CONTINUOUSLY VULCANIZING RUBBER AND PROCESSING PLASTICS




## HOW THE ROTOCURE WORKS

In operation, the rubber or plastic material is carried around an arc of the heated steel drum by a wide, high tensile, steel belt (see diagram). The belt, which is tensioned by a back roll actuated by hydraulic cylinders, maintains a pressure on the material of approximately 60 to 65 P.S.I. Located around the circumference of the drum, and bearing against the back of the steel belt, are five heating shoes.

The drum and shoes are heated internally by steam to give a material temperature of approximately 280° to 300° F for rubber and 300° to 340° F for plastics. For gauge control, the material is fed to the drum over the lower pressure roll which can exert pressure up to approximately 1000 pounds per linear inch.

The lower pressure roll is internally heated by steam to preheat the material and thus reduce the time of passage around the main drum. Where required for postheating, the top roll can also be steam-heated.

## PRODUCTS THE ROTOCURE CAN PRODUCE

Where the run of any one size or type of materials is great enough, the *Rotocure* has a number of advantages over vulcanizing presses for producing: Conveyor belting, transmission belting, floor matting (supported and unsupported), rubber flooring (sheet and tile), plastic flooring (sheet and tile) and plastic laminations. In addition, the machine has great possibilities for the production of many other rubber and plastic products.

## ADVANTAGES

The advantages of this machine over vulcanizing presses are: (1) Continuous operation increases production by eliminating interruptions for opening, unloading, loading and closing; (2) where material is cured in long lengths, double-cure around the overlap area, necking and non-uniform stretch are avoided; (3) less floor space is required, and (4) the work area can be kept cleaner and free from water which is common in belt press pits.

Comparison of production costs indicates that where manufacturing conditions favor the use of the *Rotocure*, this machine, on some products, can save up to nearly 50 per cent of the cost of producing an equivalent volume with a vulcanizing press.

## HOW YOU CAN LEARN MORE ABOUT THE ROTOCURE

We shall be glad to have a Farrel-Birmingham engineer discuss with you the possibilities of the machine for your particular conditions. The experience gained in building seven of these machines for different applications will be of value in determining what the machine can be expected to do for you. A request for an appointment (or for further details by mail) involves no obligation.

**FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.**
*Plants:* Ansonia and Derby, Conn., Buffalo, N.Y.
*Sales Offices:* Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston.

Farrel-Birmingham®

MR. CLIMCO SAYS . . . .

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*save time at the bias cutter and cutting table*

Perfect separation of stock and liner is all important during these operations—for stock adhesions at either point cause expensive down time. You can avoid such production headaches by using Climco Processed Liners that can be readily peeled from the stock without sticking.

Climco Processing of your liners assures many other profitable advantages: Liner life is greatly increased, tackiness of the stock is preserved, and gauges are more easily maintained. Latitude in compounding is enlarged, lint and ravelings are eliminated and horizontal storage is facilitated.

Since 1922 Climco Processed Liners have proved their worth to the rubber industry. Give them a trial in your plant.

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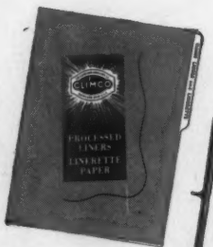


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*Treatment Contains*
**NO OIL OR WAX**
*Samples on Request*

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## PROCESSED LINERS

*Serving the Rubber Industry for 26 Years*

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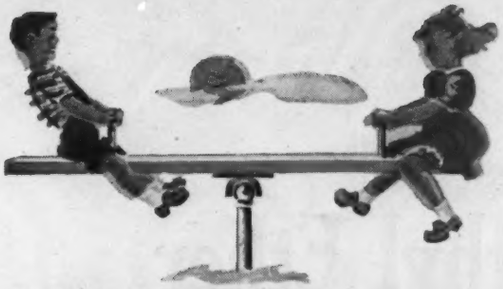
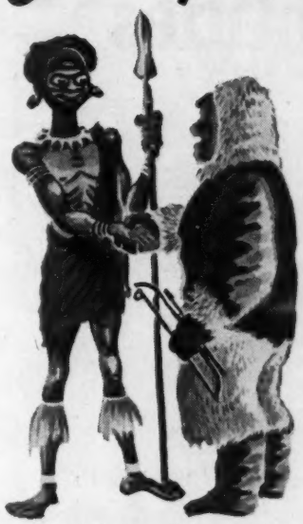


***Greater Stability!*** A polyvinyl chloride-type resin of high molecular weight, Marvinol offers superior resistance to heat, light and other normally destructive factors.

# MARVINOL® the new VINYL RESIN gives you all these advantages



***Broad Temperature Range!*** Products made from Marvinol resins show less heat deformation than other resins . . . offer positive advantages in low temperature flexibility.

***Unique Versatility!*** Easy to process, Marvinol resins may be calendered, extruded, injection molded, used in non-aqueous dispersions, formulated as unplasticized rigids. They're really versatile!

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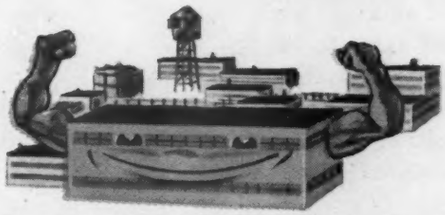

***Ultra-Modern Plant!*** New Marvinol plant contains latest equipment to assure efficient operation, uniform product, highest quality. Production quantities of Marvinol resins are now available.

***Other Advantages to Cheer About!*** Can give crystal-clear transparency, brilliant or delicate colors... unusual "dryness" . . . exceptional toughness and long life . . . may be tasteless, odorless . . . easily, quickly cleaned.

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RESINS, PLASTICIZERS AND STABILIZERS PRODUCED BY THE CHEMICALS DIVISION OF THE GLENN L. MARTIN COMPANY ▪ AN INTERNATIONAL INSTITUTION

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NOW AVAILABLE

# Polyvinyl Methyl Ether

## (PVM)

# In Pilot Plant Quantities

**You will find this New Polymer:**

I. Is soluble in a wide variety of *organic solvents* as well as in *cold water.*

II. Precipitates out of water solutions in adhesive masses when heated to about 35°C and redissolves below that temperature without loss of original properties.

III. Is especially suitable as a non-ionic heat sensitizing agent for natural and synthetic latices.

IV. May be useful as a:

Tackifying agent for adhesives and cements.
Binding agent in textile, ceramic and paint fields.
Plasticizer for cellulose nitrate and chlorinated rubbers.
Special sizing agent for paper, textile and leather applications.
Auxiliary in tanning and pigment fields.

V. Is available in the following forms:

a) Unmodified PVM (highly viscous mass)
b) 80% PVM solution in water } for convenient dispersion
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# Put Mt. Vernon On Your Calendar For Better Calendering

**The smooth, continuous operation** of your calendering machines depends to a large extent on the quality of the fabric you use.

That's why purchasers of calendering fabrics prefer Mt. Vernon. They know its high degree of fabric uniformity means better, smoother calendering—superior products. Mt. Vernon fabrics are produced from top grades of cotton under laboratory controls that cover their manufacture from the fiber to the fabric.

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*uniformity makes the big difference*

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# Butaprene* NAA is the Preferred Polymer FOR EASIER PROCESSING

- **MIXES EASILY IN BANBURYS**
- **EXTRUDES SMOOTHLY**
- **NO PLASTICIZERS NEEDED**
- **HOLDS CLOSE TOLERANCES**

EASY processing is, without question, the outstanding property of Butaprene NAA. That's why it's the *preferred* oil-resistant polymer for tubed or calendered stocks for cut gaskets, skim coatings, etc. Butaprene NAA *handles easily in Banburys* and extruders and can be processed *without plasticizers of any kind.* It's without equal for rubber seals and closures of all kinds because there are no problems created by leaching.

The Butaprene N Polymers are available in five types, including both latices and solids — all high oil-resistant products. The Butaprene Technical Staff will be glad to advise you on any technical problems involving the use of oil-resistant polymers. Simply write Xylos Rubber Company, Akron 1, Ohio.

# BUTAPRENE* N by Firestone

## AMERICA'S *most* VERSATILE ELASTOMER

* Reg. U. S. Patent Office

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DU PONT

"MONASTRAL" BLUE B

BT - 284 - D

RAMAPO BLUE

BP - 173 - D

# The Best All-Purpose Blues for Rubber and Plastics

These versatile pigments are opening new fields in plastic color possibilities because of their outstanding properties. They provide extreme brilliance . . . great stability . . . chemical inertness . . . resistance to fading . . . freedom from bleeding.

Considered the best blues from an all-round standpoint, these Du Pont pigments are easily dispersible in rubber. They are also easily dispersible and very compatible with vinyl resins and the usual plasticizers.

Ask your Du Pont salesman for details or write: E. I. du Pont de Nemours & Co. (Inc.), Pigments Department, 1007 Market St., Wilmington 98, Delaware.

*Du Pont* "CAVALCADE OF AMERICA" *returns to the air Monday, September 13—NBC network*

DU PONT

PIGMENTS

for Rubber and Plastics

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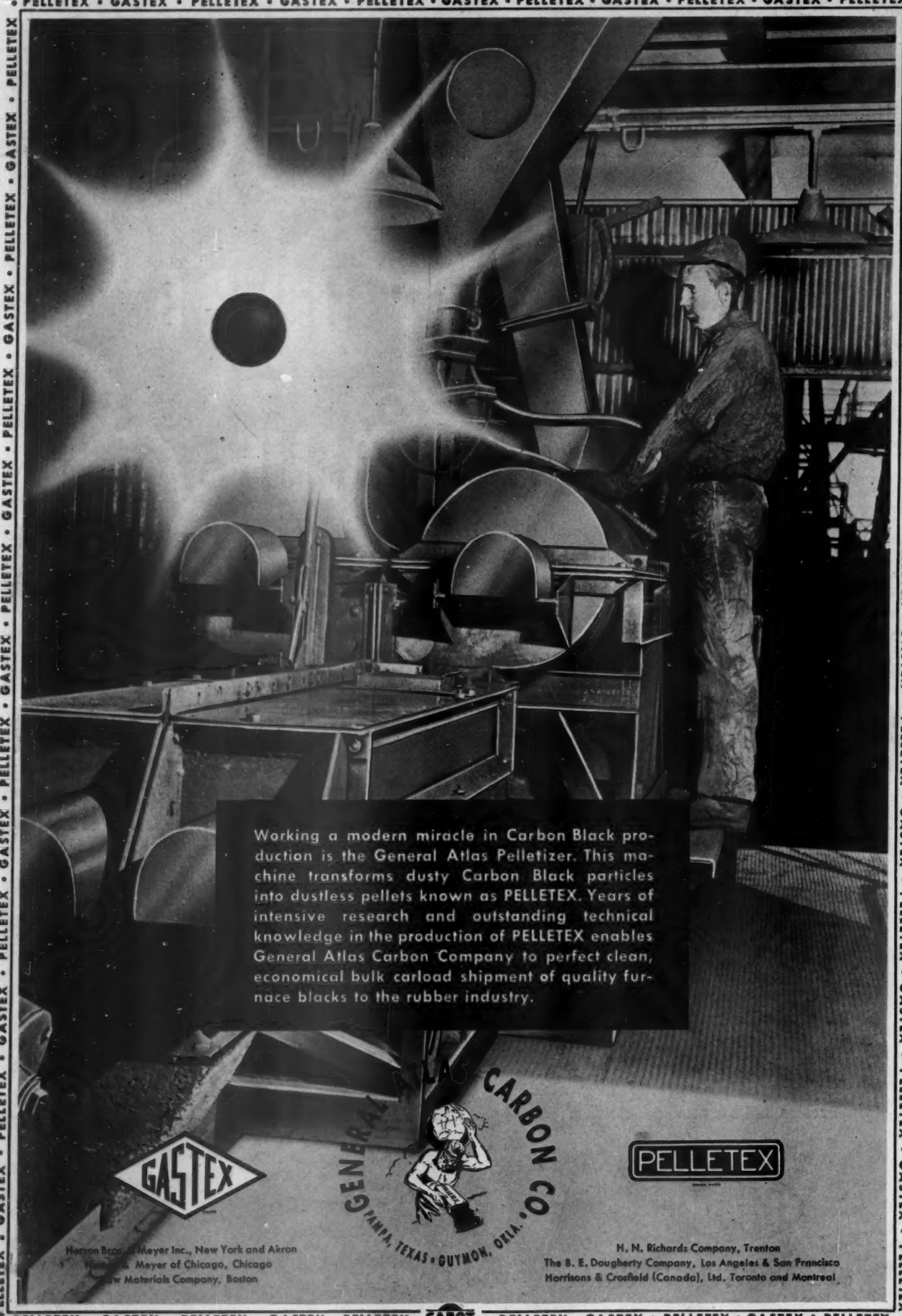
BETTER THINGS FOR BETTER LIVING

*...THROUGH CHEMISTRY*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Working a modern miracle in Carbon Black production is the General Atlas Pelletizer. This machine transforms dusty Carbon Black particles into dustless pellets known as PELLETEX. Years of intensive research and outstanding technical knowledge in the production of PELLETEX enables General Atlas Carbon Company to perfect clean, economical bulk carload shipment of quality furnace blacks to the rubber industry.
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VULCANIZING AGENT
PRIMARY ACCELERATOR
SECONDARY ACCELERATOR
RETARDER FOR
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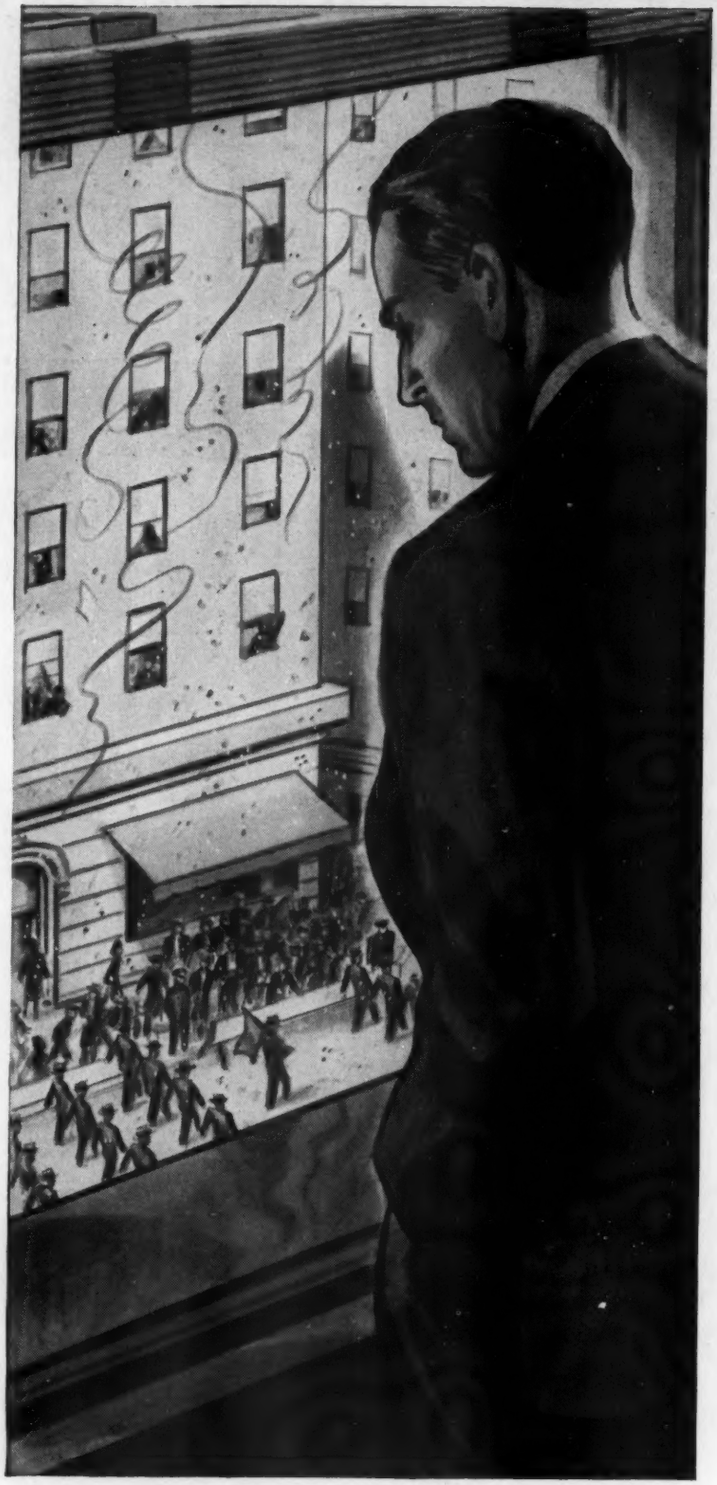
SHARPLES TRADE MARK CHEMICALS

SHARPLES CHEMICALS INC. PHILADELPHIA • NEW YORK • CHICAGO • AKRON

# MEMO TO PRESIDENTS WHO WATCHED THE BAND GO BY!



HERE'S ONE parade that isn't "all over but the shouting" after the band has passed. It's the Payroll Savings Plan for the regular purchase of U. S. Security Bonds by employees.

Though the formal spring campaign to sell Bonds is over, any company can still move forward with the parade. Right now thousands of companies are putting *additional push* behind their Payroll Savings Plans. Managements of many companies that have not yet participated are *now installing* the Plan.

It's a "look-ahead" plan, that benefits employee, company, and nation. Every $3 invested in Bonds pay $4 at maturity. Personnel records in the plants with active P. S. P. programs show improved employee attitudes—evidenced by less absenteeism and fewer accidents—as the individual's sense of security grows with Bond purchases. And every Security Bond dollar built up in the Treasury retires a dollar of the national debt that is potentially inflationary. It means less bidding-up of prices. Moreover, Bond buyers are better citizens because they have a tangible stake in the nation's future.

It's just as easy to take action now as when the campaign was at its height. Just call your Treasury Department's State Director, Savings Bonds Division, and ask for the material that helps to get a Payroll Plan started or to keep it rolling.

---

The Treasury Department acknowledges with appreciation the publication of this message by

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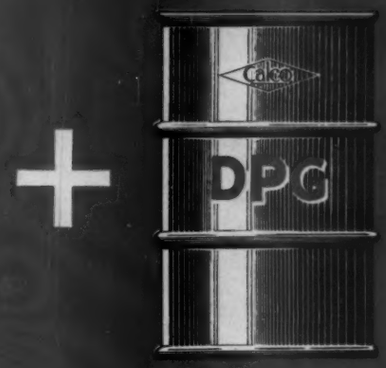


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UNION PACIFIC

# The Governor of Utah *invites You*

STATE OF UTAH
OFFICE OF THE GOVERNOR
SALT LAKE CITY

HERBERT B. MAW
GOVERNOR

To American Industry:

The State of Utah takes pleasure in presenting to American industry an opportunity for new development and expansions.

The State of Utah prides itself on the quality of its people, the tremendous extent and ready availability of its raw materials, its unlimited power resources, its unequaled transportation facilities, and its friendly attitude toward business.

These factors, together with the advantages of living under ideal home surroundings in the nation's most interesting area, have already induced many fine industries to locate in our State.

A new industrial economy is developing in our commonwealth based on the substantial foundations of the basic materials available and the happy and contented people constituting the human resources.

The establishment of your business in Utah will give you an opportunity to share in this new industrial economy and to participate in the growth already experienced in the west.

Sincerely yours,

Governor

Herbert B. Maw

* *One of a series of advertisements based on industrial opportunities in the states served by Union Pacific Railroad.*

**Unite with Union Pacific in selecting sites and seeking new markets in California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, Oregon, Utah, Washington, Wyoming.**

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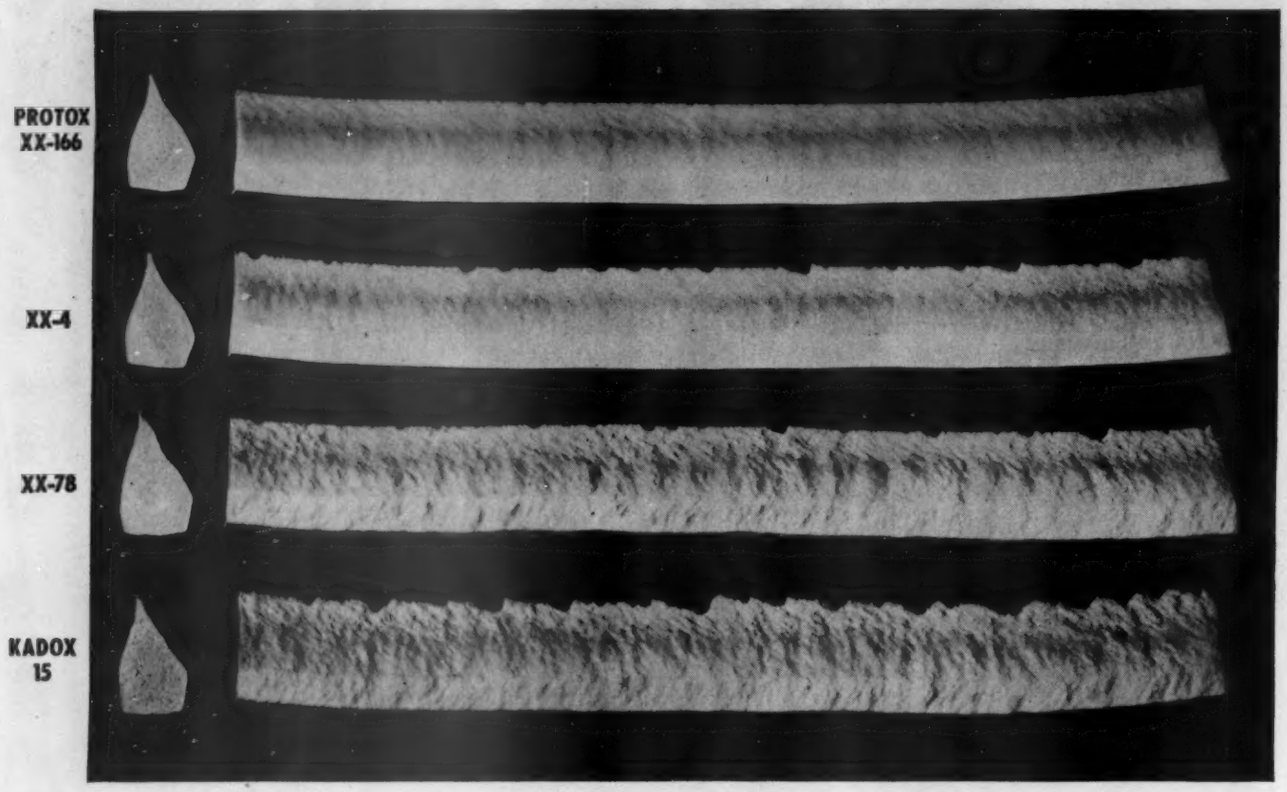
# PROTOX-166 ZINC OXIDE




ZINC OXIDE AND GR-S

## TUBING CHARACTERISTICS
## in the ½ Royle Laboratory Tuber Using the Garvey Die

EQUAL parts by weight of GR-S and Zinc Oxide of different grades, representing a range in particle size and type, were compounded and mixed under the same conditions, and allowed to stand overnight. The following day the stocks were warmed up, and tubed in the Royle tuber with the screw operating at 50 R.P.M. The cylinder temperature was 40°C., the extension temperature 62°C., and the head temperature 105°C. The processing advantages of Protox-166 are shown in the accompanying unretouched photograph.

Similar results obtained in natural rubber will be reported later.

HORSE HEAD PRODUCTS

**THE NEW JERSEY ZINC COMPANY**

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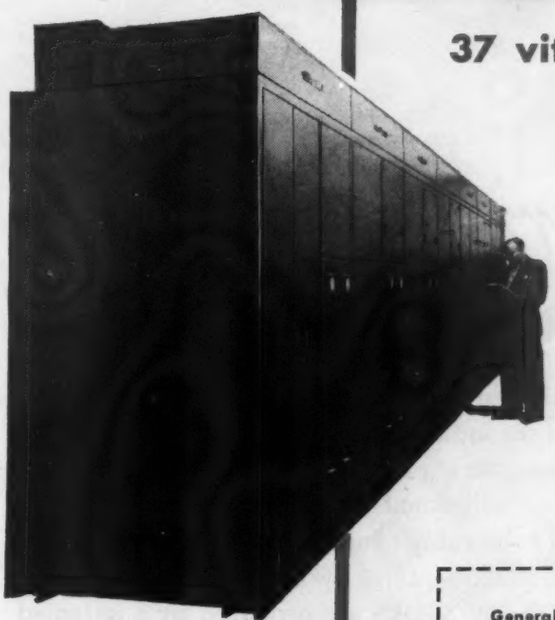
## BY GE LIMITAMP

### 37 vital operations in this rubber plant



Protection of this plasticator is just one of the vital jobs done by Limitamp starters at the Fisk Tire Plant of the U.S. Rubber Company at Chicopee Falls, Massachusetts. Over a period of four years, more than thirty-seven of these units have been installed in the Fisk Plant to operate generators, mills, Banburys, plasticators—and Fisk plans to add more.

"From a maintenance point of view, I wish we had Limitamp control on all our high-voltage motors." That's what P. L. Butterfield, Chief Electrician at the Fisk Plant says about these controllers.

Decreased maintenance costs are always an important consideration. Users of this equipment have found other advantages: high-interrupting capacity, increased safety, extra-long life, complete motor protection.

You'll need more information about these starters. Fill in the coupon and mail it to us. *Apparatus Department, General Electric Company, Schenectady, N.Y.*

General Electric Company, Sect. F676-259
Apparatus Department, Schenectady 5, N. Y.

Gentlemen:

Please send me your publication GEA-4247 on the G-E Limitamp controller.

Name_____

Address_____

**GENERAL ELECTRIC**

# *With the long strides of Rubber*

## ST. JOE IS RIGHT IN STEP

The rubber industry is constantly alert to the improvement of its products. Research and development facilities of the industry are currently being expanded, and it is generally predicted that many new products will soon appear on the market. Naturally, this will require additional quantities of raw materials.

In step with the long strides of the rubber industry, the St. Joseph Lead Company is now enlarging the production capacity of its Josephtown, Pa. plant, where ST. JOE Lead-Free ZINC OXIDES are produced by a patented Electro-Thermic process. Additional tonnages of our American Process Zinc Oxides will thus become available, and the already established high quality of our Black Label, Red Label and Green Label Zinc Oxides will continue to be of service to the rubber industry.

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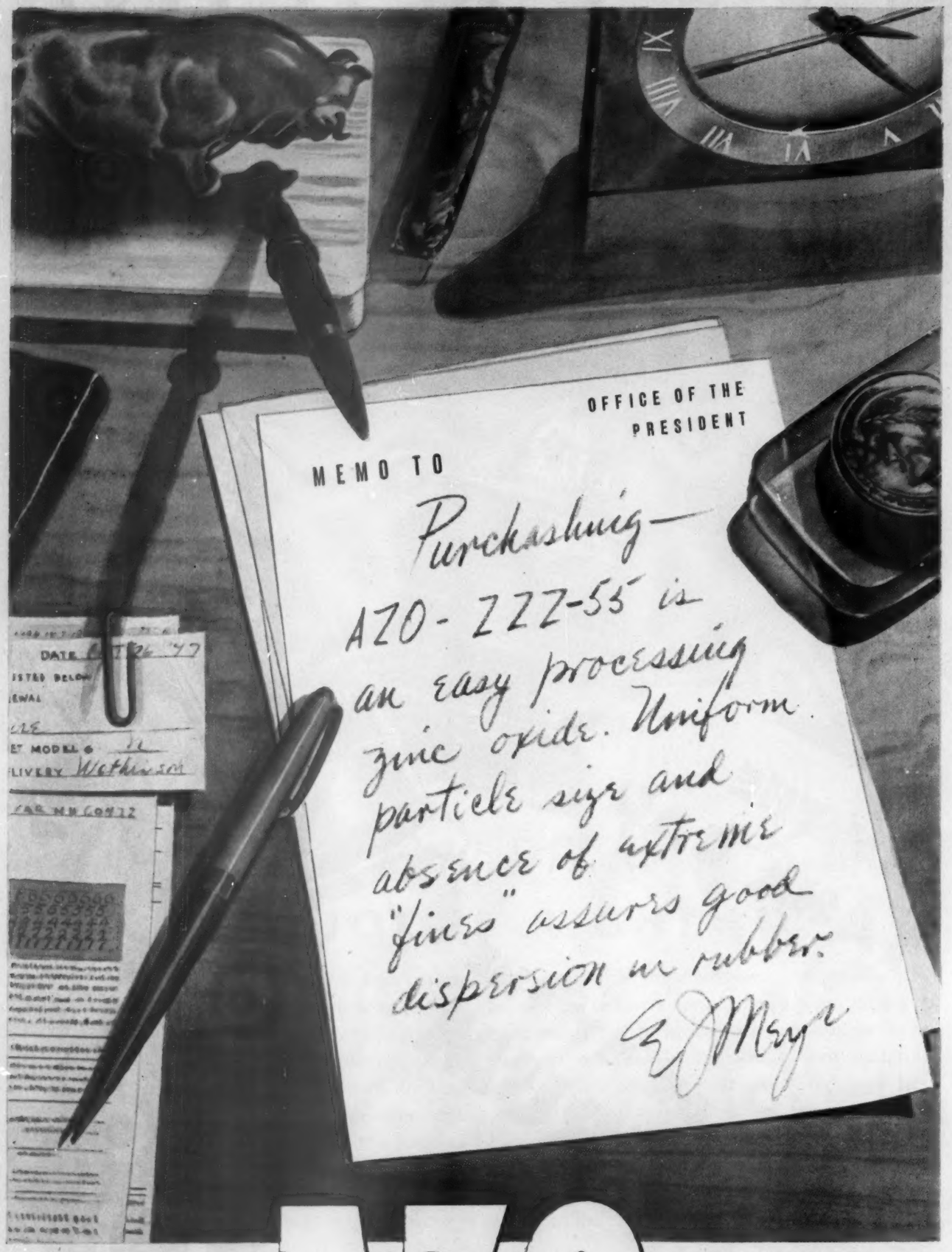


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# METHOCEL

**is back in carload quantities!**

Methocel (Dow Methylcellulose) is used successfully in the rubber industry as a thickening agent for the control of viscosity in latices and for the creaming of latices. Methocel, a cold water soluble cellulose ether, is compatible with most rubber dispersions. Other significant advantages are its uniformity and purity and its ability to produce the creaming effect, quite readily. Methocel is available for shipment *now.* Take advantage of its unique properties. Write to Dow for more detailed information about Methocel and its uses in the rubber industry.

## METHOCEL ADVANTAGES

1. Methocel is compatible to an unusual degree with a wide variety of modifying agents including alcohols, wetting agents, plasticizers and resins.
2. Methocel is odorless, harmless.
3. Methocel solutions ordinarily do not require preservatives.
4. Methocel is a uniform, synthetic chemical product.
5. Methocel solutions are neutral.
6. Methocel solutions remain clear and colorless over a wide pH range.
7. Methocel is completely soluble in water.

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**For wire and vinyl compounding.**

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## WITH TITANOX PIGMENTS

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Let the staff of our nearest Technical Service Laboratory show you how to get the most out of your pigment supply.

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## LOW-VISCOSITY, POLYMERIC VINYL PLASTICIZER

# PARAPLEX G-50

### *for plasticizing permanence, plus ease of handling*

The permanent plasticizing effect of a high-molecular weight polyester plus the simplicity of incorporation and handling of a monomeric-type plasticizer — these are the outstanding advantages of Paraplex G-50 as a modifier for polyvinyl chloride, polyvinyl acetate, nitrocellulose, and acrylic resins. In addition, the low viscosity of Paraplex G-50 makes it of particular interest in dispersion compounding for dipping, molding and extruding work.

## CHECK THESE ADVANTAGES

**PLASTICIZING PERMANENCE** — Paraplex G-50 stocks are outstanding in durability . . . retain their excellent physical properties over long and severe periods of usage.

**PROCESSING EASE** — For both calendering and extruding compounds, Paraplex G-50 stocks process easily—are notable for smoothness and high finish.

**FAST PIGMENT WETTING** — Paraplex G-50 is an excellent pigment grinding medium . . . gives better coverage, color uniformity, and pigment binding than monomeric-type plasticizers.

**NON-MIGRATIBILITY** — Paraplex G-50 does not migrate to the surface of vinyl films on aging . . . ends "lacquer lifting" problems.

**NON-EXTRACTABILITY** — Like Paraplex G-25 and G-40, Paraplex G-50 is insoluble in oils, fats, water, and aliphatic hydrocarbons—provides soft, flexible polyvinyl chloride compounds with high service resistance.

**FREEDOM FROM ODOR AND TASTE** — Compounds plasticized with Paraplex G-50 are eminently suitable for rainwear, packaging, tubing and other special applications where lack of odor and taste are important.

**ADAPTABILITY TO DISPERSION COMPOUNDING** — Free-flowing plastisols made with Paraplex G-50 show outstanding viscosity stability, and can be fluxed satisfactorily at temperatures somewhat higher than those used for monomeric-type plasticizers.

For full details on the characteristics and uses of Paraplex G-50, write for our latest bulletin. Our technical staff will be glad to answer any questions you may wish to ask—and to advise you concerning any application of Paraplex G-50 or its companion resins, Paraplex G-25 and G-40.

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*WASHINGTON SQUARE, PHILADELPHIA 5, PA.*

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***Forty-seven years of experience lie behind Pequanoc Reclaims. There's a standard for your every need.***

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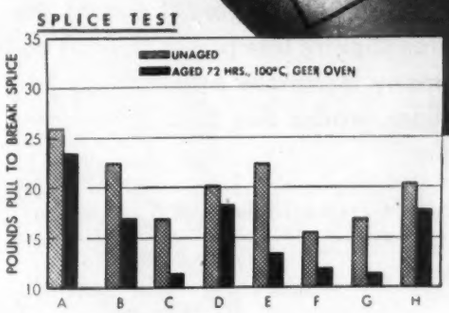
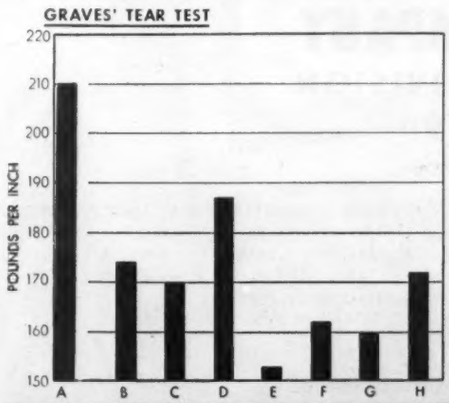
*For the Compounder*

# A NEW DEVELOPMENT




Butyl rubber is often dry and difficult to splice. However, plasticizer Vistac #1 shows such superior compatibility with GR-I, and imparts such characteristics of flow and tackiness that the splice is as strong or stronger than the body of the tube. The strength of the valve stem mounting is correspondingly improved.

In addition, the use of Vistac #1 as a plasticizer in butyl inner tubes so increases the tear resistance that in the event of a blowout, damage to the tube is minimized.

Vistac #1 retains all of butyl rubber's inherently superior qualities, and improves its resistance to aging.

"A" is a butyl inner tube manufactured by Cascade Rubber, Inc., Cuyahoga Falls, Ohio, using Vistac #1 as the plasticizer.

"B" through "H" are butyl rubber inner tubes manufactured by various rubber companies, presumably using the customary softeners.

Write for our new bulletin on "Vistac #1 in Butyl Inner Tubes."

Advance

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**245 Fifth Avenue • New York 16, N. Y.**

# ULTRAFINE PRECIPITATED CALCIUM CARBONATES

Try improving quality of your rubber and plastics products by use of ultrafine, non-abrasive, precipitated calcium carbonates.

**In RUBBER** products of white or light colors, Multifex grades impart high tensile strength and resistance to tear (hot and cold). They yield low modulus, high elongation, good flexibility and low heat build-up properties. For comparative particle size materials, power requirements for mixing are exceptionally low. Best properties are developed at 60 to 100 parts loading to 100 parts natural or synthetic rubber.

**In PLASTICS,** Multifex grades can be used to increase hardness, improve scratch resistance and decrease whitening with minimum loss of tensile strength and elongation at break. Light stability of plastic compositions are improved with Multifex. Loadings of 10 parts to 50 parts per 100 parts of plastic-plasticizer give improved properties.

## THREE MULTIFEX GRADES

**1. MULTIFEX** is an uncoated, non-abrasive calcium carbonate, precipitated from water clear solutions, of about .03 to .04 microns particle size.

**2. SUPER MULTIFEX** is of the same particle size as MULTIFEX but which has been given a double coating (before and after drying) with an organic compound. The first coating retards agglomeration during drying. Both coatings aid dispersion in mixing processes.

**3. MULTIFEX MM** differs from the other grades in that the particle size is .05 to .06 microns. This grade is more easily dispersed due to this feature, requires slightly less power to incorporate, and in many instances provides quality equal to the finer grades due to a more complete dispersion.

NOTE: MULTIFEX MM can be supplied with a dry coating if customer's requirements demand.

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**PURE CALCIUM PRODUCTS DIVISION**

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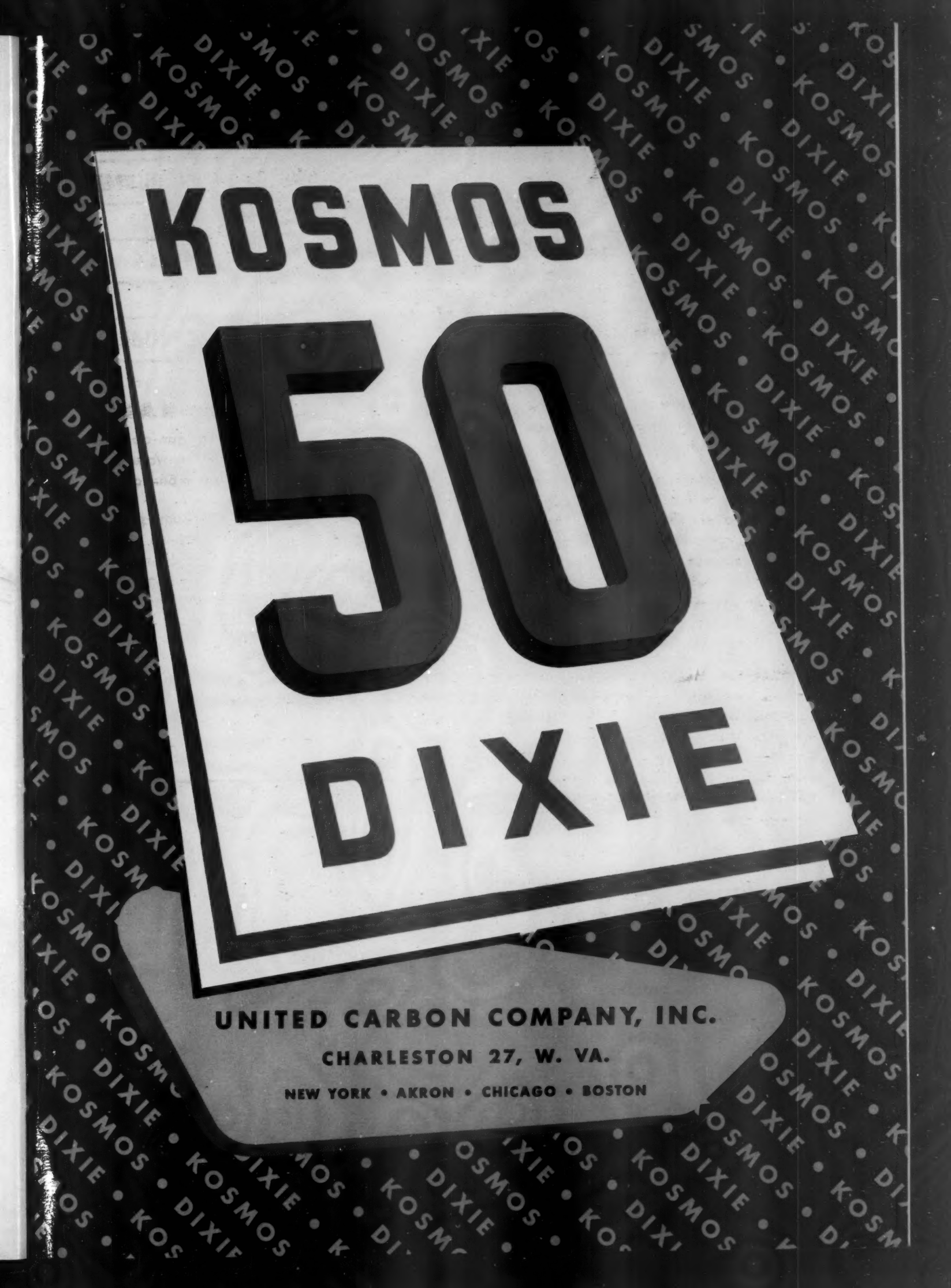
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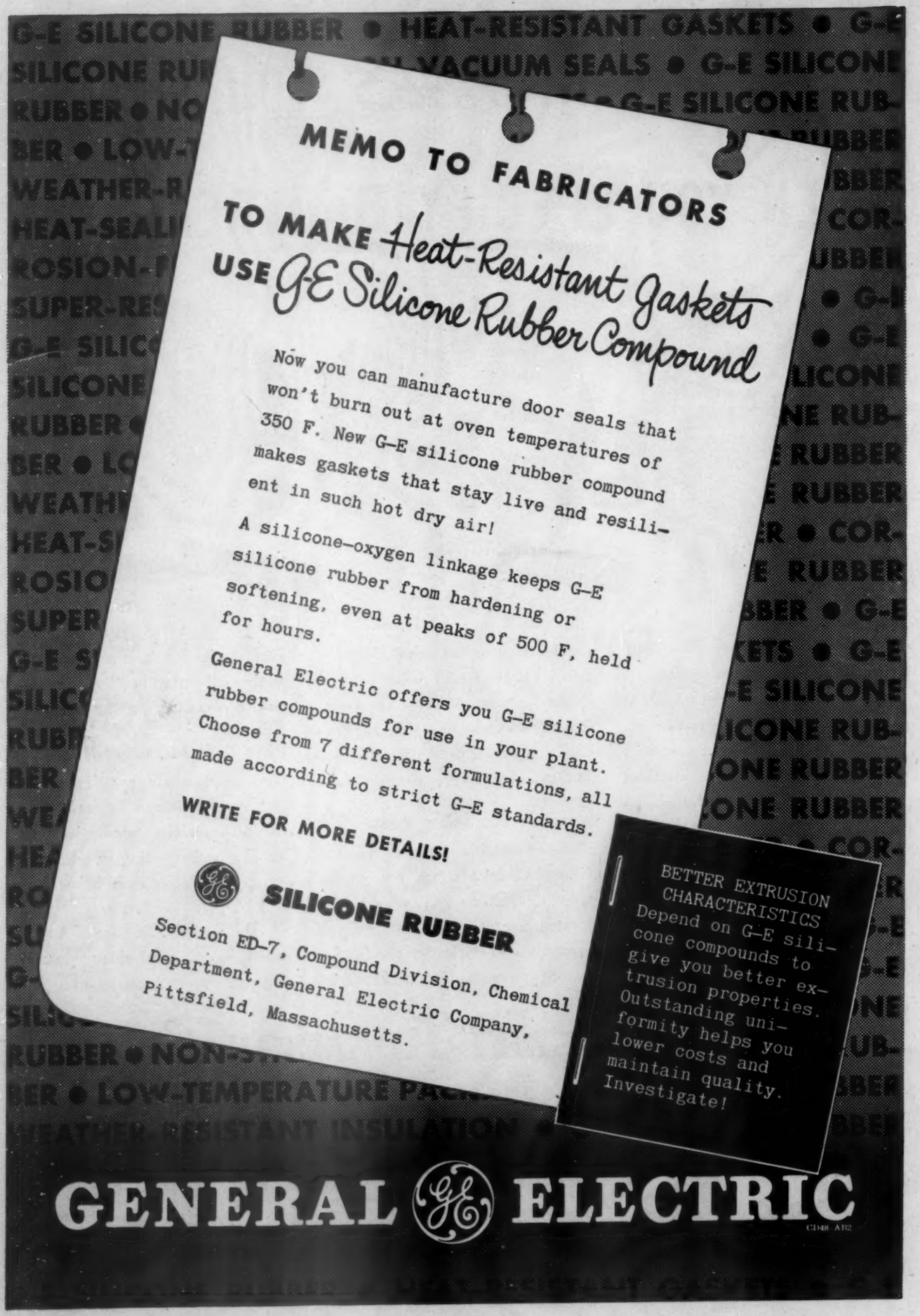
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TO MAKE Heat-Resistant Gaskets
USE G-E Silicone Rubber Compound
Now you can manufacture door seals that won't burn out at oven temperatures of 350 F. New G-E silicone rubber compound makes gaskets that stay live and resilient in such hot dry air!
A silicone–oxygen linkage keeps G-E silicone rubber from hardening or softening, even at peaks of 500 F, held for hours.
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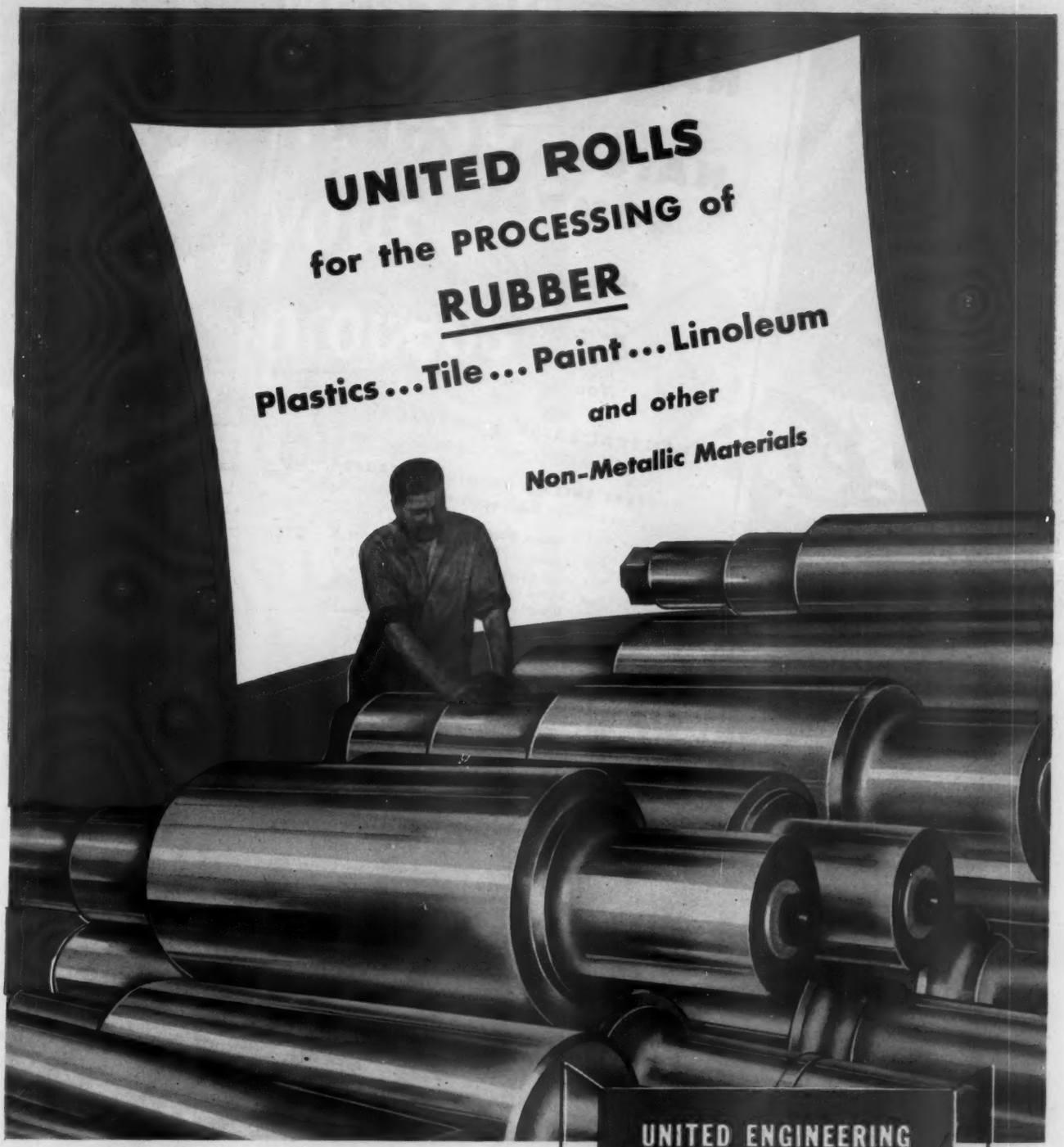


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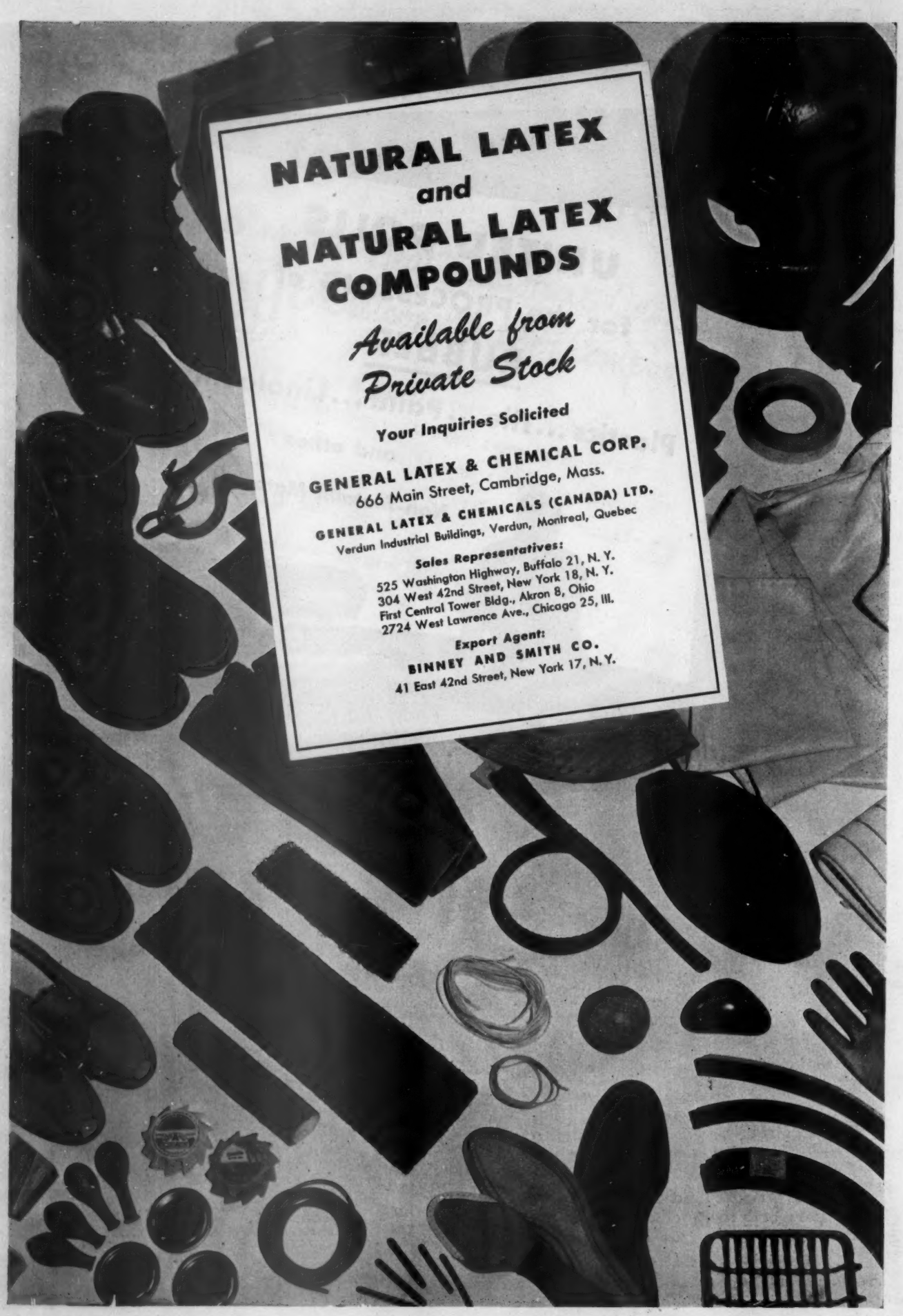
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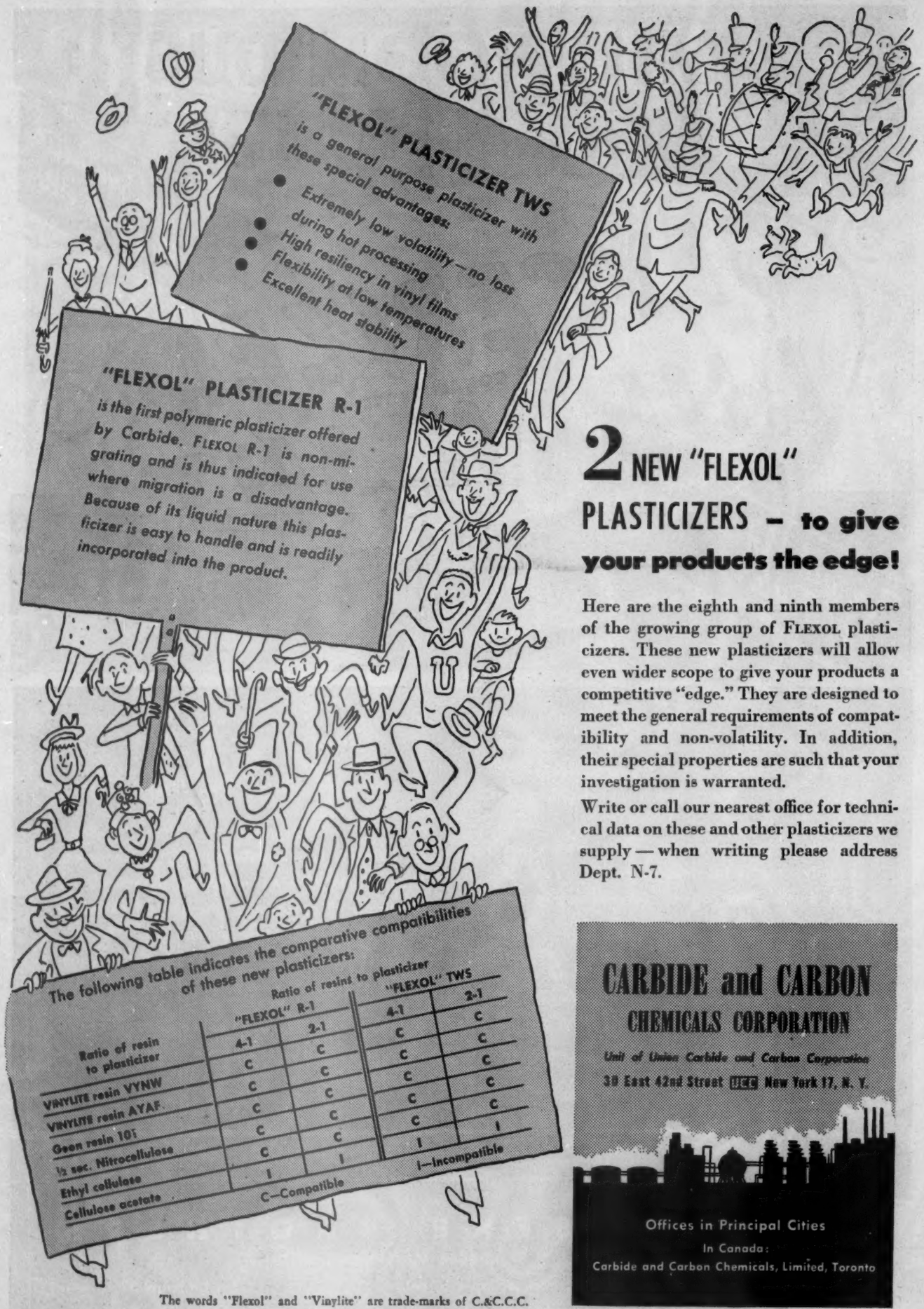


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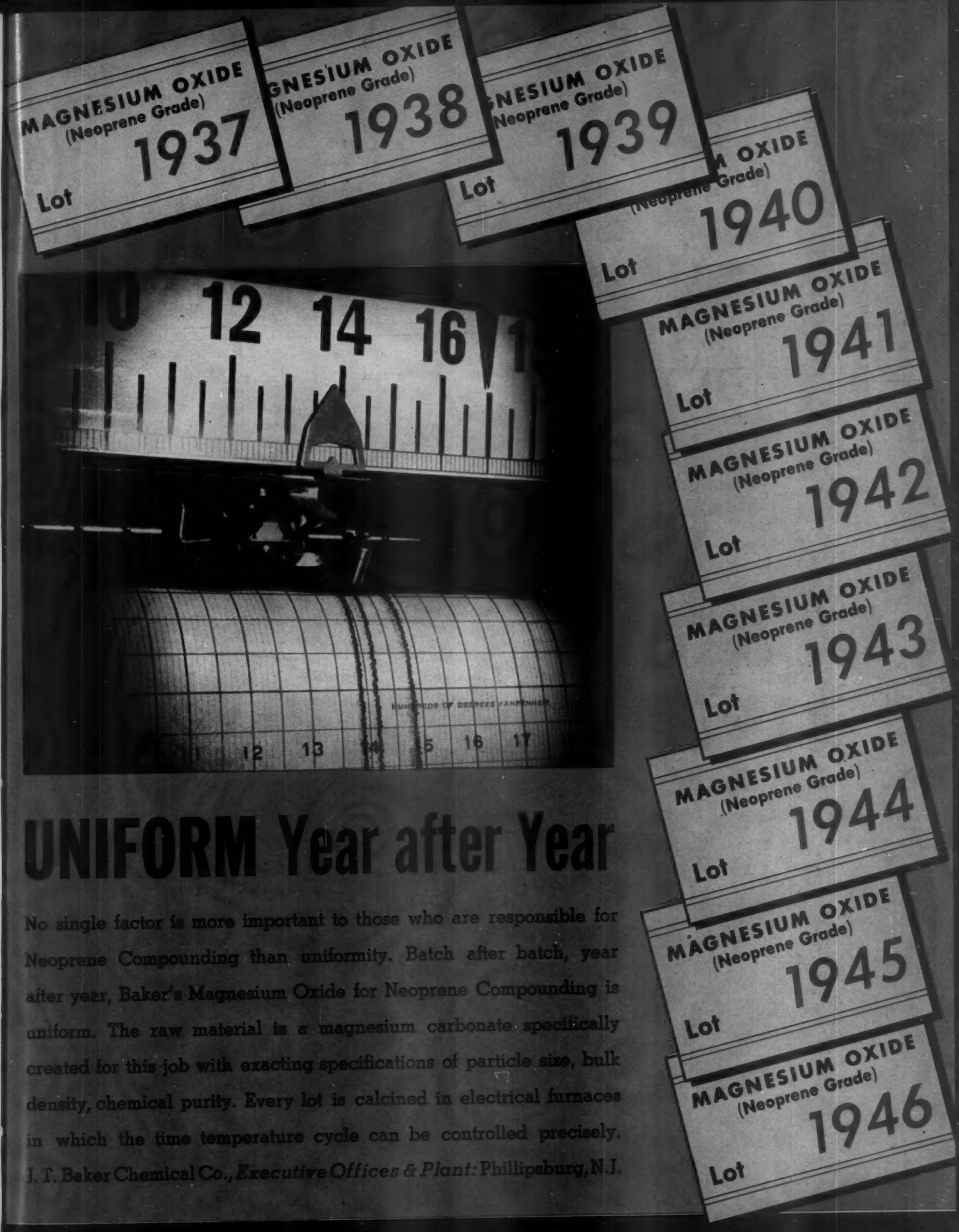


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VOLUME 63
NUMBER 4

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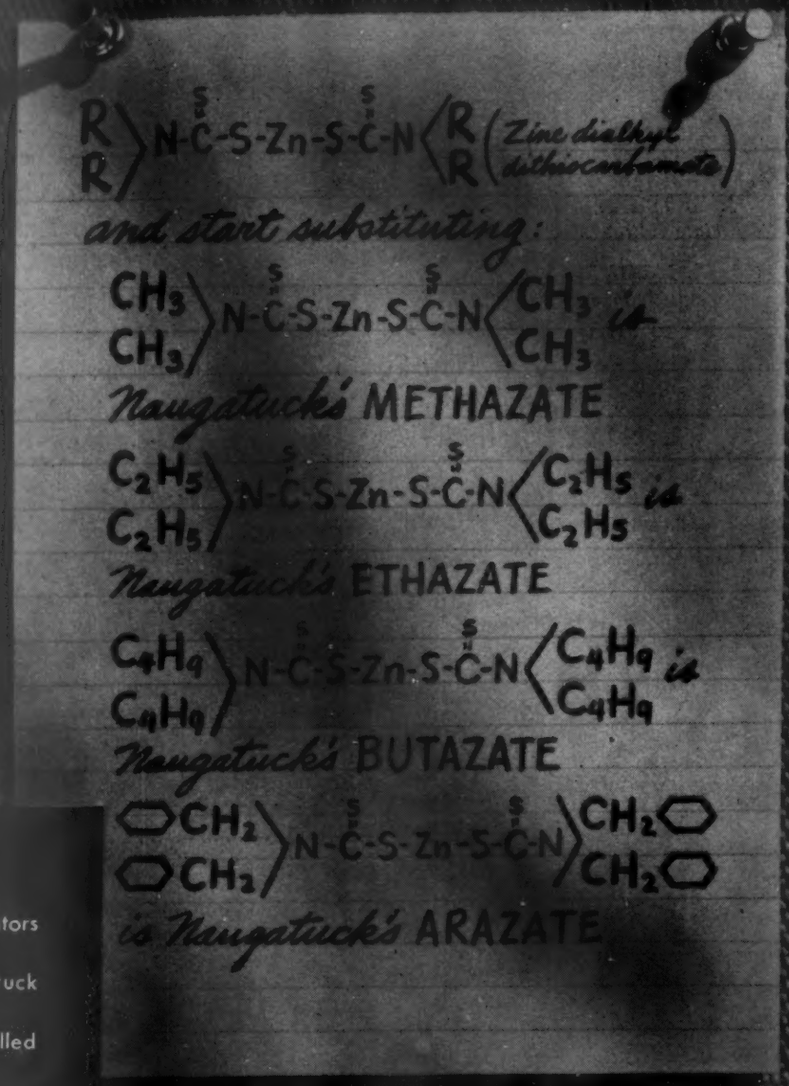
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Naugatuck's ETHAZATE
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RUBBER AGE

Vol. 63, No. 4 JULY, 1948

# Report on the Second Rubber Technology Conference

## London, England, June 23-25, 1948

By PETER P. PINTO

THE Second Rubber Technology Conference, held on June 23, 24 and 25, 1948, in London, England, under the auspices of the Institution of the Rubber Industry, was concluded on the evening of June 25 with an impressive dinner at the Connaught Rooms, London, following nine technical sessions extending over three days and attended by over 600 delegates from 23 countries.

The first International Rubber Technology Conference, also held under the auspices of the I.R.I., was held in London in 1938 and was attended by 553 delegates. Over 100 papers were presented at that time, later appearing in book form as the "Proceedings of the Rubber Technology Conference, 1938." A similar plan is to be followed this time and all of the papers presented at the 1948 Conference will be issued in book form. A copy will be sent free to each delegate who registered for the 1948 Conference but copies will be available to others at £2/2/0 (approximately $8.40).

The Conference took place in Central Hall, Westminster, London, and consisted of nine sessions (Nos. 5 and 6 running simultaneously), each session being devoted to a particular subject as follows:

1. Synthetic Rubber
2. Chemistry of Rubber
3. Physics of Rubber
4. Testing and Analysis
5. Natural and Synthetic Rubber Latices
6. Discussion: Tensile, Hardness, Abrasion and Tear Test Methods
7. Compounding Ingredients—General
8. Compounding Ingredients—Carbon Black
9. Developments in Factory Processes and Products since 1938.

### Two Special Events Held

In addition, there was a demonstration in an adjacent room of "Rubber Physical and Chemical Properties" after the first day's sessions. The demonstration consisted of a series of exhibits, arranged by E. F. Powell of Dunlop, assisted by other members of that company's research and development staff. The experimental exhibits included the following:

Latex and Aqueous Dispersions (a film showing Brownian movement in dispersions of various pigments);
Permeability of Butyl vs. Natural Rubber;
Elastic Properties of Rubber;
Electrically Conducting Rubbers;
Photo-Elastic Effects in Rubbery Materials;
Frictional Properties;
Chemical Analysis by Micro Methods;
Historic Display.

The Historic Display, arranged by J. M. Chrystal, of the George Spencer Moulton Co., featured a collection of rubber documents over 100 years old, including

letters from Charles Goodyear, and an exhibit of a 17-inch rubber ring which had seen 75 years of service under sea water in a lock gate in the Bristol docks, the ring being in remarkably good condition and still retaining much of its original elasticity.

The discussion (No. 6) on Tensile, Hardness, Abrasion and Tear Test Methods was arranged in order to assist the delegates to Technical Committee No. 45 of the International Organization for Standardization (I.S.O.) which was to consider the international standardization of these four test methods on June 28 and 29. The discussion was based on a study of the British, American, French, German and Italian national standards for these tests so as to bring about some degree of standardization which would meet with the acceptance of the International organization.

## Opening of the Conference

At the opening of the Conference on the morning of June 23, Mr. F. D. Ascoli, President of the Institution of the Rubber Industry, after welcoming the delegates, introduced Sir Robert Robinson, President of the Royal Society and Honorary President of the Conference. Sir Robert mentioned the meagre references to the botanical and agricultural side of the industry in the papers to be presented and pointed out the industry owed its existence to the early activities of a group of botanists, particularly to Sir Henry Wickham, who in 1876 procured supplies of rubber seeds in Brazil, and to Henry N. Ridley who did much pioneer work on rubber cultivation in the Straits Settlements in 1889. He also mentioned the development of "synthetics" and their possibilities. Following Sir Robert's talk, the first session, on "Synthetic Rubber," got under way, with Dr. W. J. S. Naunton, of Imperial Chemical Industries, Ltd., as Chairman.

As a complete set of preprints of the papers to be presented had been distributed to all delegates in advance, each author was called upon to give only a five-minute resume of his paper. Discussion was then held on his paper (or after several authors had given their resumes), based on questions submitted to the Chairman. Additional questions and discussion were allowed from the floor if time permitted. This method of handling the presentation of papers and the subsequent discussion based on an advance study of the printed papers resulted in more searching and provocative questions and discussion than would have been possible if the discussion had been based entirely on the oral presentation of the papers in full with charts and slides. The delegates took full advantage of the opportunity to question the authors and as the discussion will become a part of the printed papers when they appear in book form, it is apparent that the papers will be of considerable greater value to all rubber technologists, particularly those who were not in attendance at the Conference.

Each session was conducted by a specially selected Chairman, assisted by a Deputy Chairman whose duty it was to time each speaker (both authors and delegates who discussed the papers) by means of colored lights visible to the speaker. The authors sat at a table on the stage and were called on in turn to give their papers in abbreviated form.

The Chairmen for the various sessions were: (1) Dr. W. J. S. Naunton, Imperial Chemical Industries, Ltd.; (2) Dr. S. S. Pickles, George Spencer Moulton & Co.; (3) Dr. G. Gee, British Rubber Producers' Research Ass'n.; (4) Dr. J. R. Scott, Research Association of British Rubber Manufacturers; (5) Dr. P. Schidrowitz, Consultant; (6) Dr. J. R. Scott; (7) Mr. S. A. Brazier, Dunlop Rubber Co., Ltd.; (8) Mr. M. M. Heywood, Firestone Tire & Rubber Co., Ltd.; (9) Mr. H. Rogers, Institution of the Rubber Industry.

The Conference proved to be an unqualified success from every angle. The papers were of a distinctly high calibre and the discussion was lively, adding much to the value of the papers and the meeting as a whole. Nor can the value of personal contact between rubber technologists from all over the world be underestimated. Men who knew each other only by reputation or who had not seen each other for years had an opportunity to exchange experiences or discuss developments in their respective fields to their mutual advantage. More international meetings of rubber technologists are bound to result in a better informed and more closely knit rubber industry.

## Three Social Events Featured

Supplementing the technical sessions but none the less an important part of the Conference, were the two dinners and the luncheon, all of which were thoroughly enjoyed by the delegates.

On the night of the opening day of the Conference, the Imperial Chemical Industries, Ltd., were hosts to the delegates at a formal dinner held at the Park Lane Hotel, Piccadilly, London. Toasts were proposed to the Conference and to Imperial Chemical Industries, Ltd., by Mr. John Rogers and Mr. F. M. Panzetta, respectively, to which responses were made by Mr. Herbert Rogers and Dr. C. T. Cronshaw. This first social gathering of the Conference was enjoyed by all and brought forth an unofficial vote of thanks to the hosts of the evening—the Chairman, the Rt. Hon. Lord McGowan, and the Directors of the Imperial Chemical Industries, Ltd.

On the following day, after the morning session, the delegates were invited to a luncheon at the Trocadero Restaurant, Piccadilly Circus, sponsored jointly by the officers and Council of the Research Association of British Rubber Manufacturers and the Board of the British Rubber Producers' Research Association. Over 400 were in attendance at what proved to be a most successful and enjoyable affair.

Mr. H. Eric Miller, Chairman of the Board, B.R.P.R.A., presided at this luncheon and Mr. J. Harold Wilson, Member of Parliament and President of the Board of Trade, was the principal guest. Mr. Miller spoke of the presence of so many of the industry's leading technical men from many countries and of the work these men were doing—at the Conference and in their laboratories—to help the ordinary man to benefit from rubber. He referred to the "synthetics"—as he preferred to call synthetic rubber—and of the many claims made for them in the American journals, but he questioned whether any particular type of synthetic would look as good in 20 years as it did when it came out of the laboratory. Natural rubber, on the other hand, continued Mr. Miller, had proved its worth for many generations and rubber growers would not take the advent of synthetics lying down.

## Wilson Discusses Present Situation

Mr. Wilson, an accomplished speaker who evidently had made a study of the rubber situation for the occasion, replied to the toast by reviewing the 1938 Conference and the results of that meeting and the many developments and changes in processes which had taken place since then. He referred to the fact that ten years

ago natural rubber was the mainstay of the industry but that in the meantime synthetic rubber had been made successfully in the United States and grown in volume from 8,000 tons in 1941 to 860,000 tons annually at the end of the war in 1945. The advent of synthetic rubber naturally presented a problem to growers of natural rubber and Mr. Wilson felt that this struggle was to be determined on purely economic levels.

Fuller and wider use of rubber, continued Mr. Wilson, called for very close cooperation between growers and manufacturers—the growers striving to produce rubber of the right quality at the right price, and the manufacturers developing new and wider uses of rubber. He believed further that increased use of rubber was of vital importance to the whole world of economic society. "If the United Kingdom," Mr. Wilson went on to say, "could today count on the same dollar earnings from sterling area rubber sold to the United States and other dollar areas, our dollar problem and the world's dollar problem would be a much smaller one than it actually is.

"We are, it is true, selling more natural rubber to the United States today from the sterling area than we were in 1938, but because of the overhanging problem of American synthetic production, the price we are receiving for that rubber—and I am speaking now on behalf of the sterling area and all rubber producing areas —is not in anything the same proportion as the prices of the goods we are importing from the dollar area. That is why I stress the importance of economic considerations becoming paramount, rather than many of the other highly important considerations which are affecting the world rubber situation but which are no less affecting the world position in terms of the balance of payments."

Other speakers at the luncheon were Mr. H. Rogers, Chairman of the Council, R.A.B.R.M., who commented on the large number of delegates from other countries, and Sir Harry A. F. Lindsay, Director of the Imperial Institute, who recounted how Llandolphia wild rubber from Africa was used during the war as an emergency substitute for Hevea and who suggested also a united front by rubber research organizations to the Malayan government for greater financial aid and a larger research staff.

## I.R.I. Conference Dinner

The final event on the Conference program was the dinner given by the Institution of the Rubber Industry to the delegates on Friday night, June 25. The dinner was held at the Connaught Rooms, Great Queen Street, Kingsway, London, with over 400 delegates and guests in attendance.

The Chairman was Mr. F. D. Ascoli, President, I.R.I., and among the guests were Sir John Anderson, Mr. Fordyce Jones, Minister of Education George Tomlinson, and Dr. R. P. Dinsmore of the Goodyear Tire & Rubber Co., to whom was awarded the Colwyn Medal for 1947. Sir John commended the I.R.I. for its war efforts and attributed to rubber—natural, synthetic and reclaimed—the margin of victory for the Allies in the war. In response, Mr. Ascoli thanked the speaker and recounted some of the history of the I.R.I. He explained that it was not a research body, but worked in the closest contact with all rubber research bodies in the United Kingdom. To further the aim of educating aspirants without regard to their position in life and without fear or favor, the Institution has established a diploma system, ranging from the licentiateship to the fellowship. To crown its achievements, Mr. Ascoli said, I.R.I. offered two prizes to the industry, one being the Colwyn Medal and the other an invitation each year to a leading technologist to deliver a Foundation Lecture. The speaker also noted that the latest development was the establishment of a National College of Rubber Technology, with Mr. Herbert Rogers as Chairman of the governing body.

**Delegates from the United States to the Second Rubber Technology Conference London, June 23, 24, 25, 1948**

S. L. Bass, Dow Chemical Co.
H. G. Bimmerman, E. I. du Pont de Nemours & Co.
D. Chase, Goodyear Tire & Rubber Co.
L. H. Cohan, Witco Chemical Co. and Continental Carbon Co.
H. I. Cramer, Sharples Chemicals Inc.
D. F. Cranor, Binney & Smith Co.
J. M. Davies, B. F. Goodrich Co.
R. P. Dinsmore, Goodyear Tire & Rubber Co.
I. Drogin, United Carbon Co.
H. W. Grote, Phillips Petroleum Co.
P. Ottenhoff, E. I. du Pont de Nemours & Co.
P. P. Pinto, Rubber Age, N. Y.
W. F. Russell, R. T. Vanderbilt Co.
W. R. Smith, Godfrey L. Cabot Co.
C. A. Stokes, Godfrey L. Cabot Co.
B. M. Vanderbilt, Standard Oil Development Co.
A. J. Warner, American Society for Testing Materials
L. A. Wood, National Bureau of Standards
D. L. Worf, Office of Naval Research

In addition the following U. S. delegates were registered but were unable to attend: R. J. Noble, Heveatex Corp., and H. W. Walker, E. I. du Pont de Nemours & Co.

## Presentation of Colwyn Medal

Mr. Ascoli then recounted the origin of the Colwyn Medal, which is presented annually to a member of the rubber industry in recognition of conspicuous service to the industry as determined by the I.R.I. Council, following which he presented the Colwyn Medal for 1947 to Dr. R. P. Dinsmore, prefacing the presentation with the statement that Dr. Dinsmore was the 16th recipient of the medal and the first American technologist to be so honored. The award was made "in recognition of services of the highest value rendered to the technology of a world-wide industry by Dr. Dinsmore." Mr. Ascoli recounted how he had first met Dr. Dinsmore in 1932 when the latter was assistant to the factory manager in Akron. Among the achievements of Dr. Dinsmore were the development of Pliofilm, the use of rayon cord in tires, and the prominent part he took in the development of synthetic rubber both before and during the war.

Dr. Dinsmore acknowledged the presentation of the medal by thanking the Institution in the name of the American synthetic rubber industry with whom his name had been coupled. He stated that the I.R.I. Council had displayed an unusual maturity of spirit in awarding the Colwyn Medal for an accomplishment which might well constitute a future threat to the rubber plantation industry. He then recounted the beginnings of synthetic rubber in the United States. Dr. Dinsmore stressed the point that American technologists did not rush precipitately into that venture. They discussed it in 1939, took a few preliminary steps in 1940 and 1941, but only after December 7, 1941, did they really begin to move, at first uncertainly but then, after the Baruch Report, systematically. The appointment of a Rubber Director was the signal for a cooperative program by the rubber, chemical and petroleum companies, who

were required in a few months to complete work which ordinarily would have taken years. The task was considerably hampered by the turmoil of war, but despite the lack of complete data and the shortage of men and materials, the new industry was launched successfully.

Such a rubber crisis, said Dr. Dinsmore, must not occur again. A synthetic rubber industry must be preserved for defense. However, natural rubber has the great advantage of being an agricultural crop not relying on diminishing petroleum resources or more expensive coal products. The cost of natural rubber could be lowered substantially and its uniformity be improved in order to assure future protection of the plantation industry. However, stated Dr. Dinsmore, it seemed to him a serious error to assume that natural rubber need fear no competition from a material which is its equal in quality. Reclaimed rubber. a vastly inferior and cheaper material, had demonstrated the fallacy of such an assumption. Natural rubber could only be secure if its cost made it so.

Mr. Herbert Rogers then toasted the Allied Associations—various producers and rubber manufacturer's associations—with whom I.R.I. worked as allies and paid tribute to these groups and to various members who had done so much towards building up the I.R.I. Mr. A. Healey, President of the Research Association of British Rubber Manufacturers, responded by calling attention to the importance of rubber in helping to improve the standard of living in almost every country in the world and said that accordingly a maximum of research and development must be supported through the established organizations of the industry.

Other speakers were R. B. Clarke who welcomed the overseas delegates, Dr. R. Houwink who responded for the delegates from other countries, Mr. Fordyce Jones who toasted the guests, and finally Mr. George Tomlinson, Minister of Education, who told of his interest in rubber education and particularly the newly founded Rubber College and the need for linking industry and education for the betterment of mankind.

As the Conference ended the delegates were frank in their admiration at the successful completion of the long program and the clock-work precision with which every detail of the meeting was conducted. The committee in charge of arrangements, particularly John F. Coleman, the Conference Secretary, and his staff, are to be congratulated on a job not only well conceived but well done.

# Abstracts of Rubber Technology Conference Papers

## Synthetic Rubbers

**Comparisons of Natural and Butadiene-Styrene Rubbers. *R. P. Dinsmore and J. H. Fielding (Goodyear Tire & Rubber Co., Akron, Ohio).***

GR-S has improved in quality and uniformity since it was introduced, and experience has enabled us to make high-quality products with it. The paper covers only general-purpose GR-S of a fixed monomer ratio, although there are a number of such rubbers. Originally less efficient to process than natural rubber, GR-S now is usually more efficient. Mixed blacks and latex master-batches are important processing aids.

The rate of vulcanization of GR-S is seriously affected by high sulfur and high mercaptobenzothiazole. Careful compounding is necessary to obtain proper balance between strength, flex-life, and resilience. Likewise, for best aging properties, lower sulfur and Captax are indicated than would normally be used for rubber.

GR-S requires reinforcement with fine pigments, for most purposes, since otherwise it has little strength. Even so, it suffers from heat shortening at elevated temperatures, whereas rubber does not. Flex cracking develops more slowly, but spreads more rapidly in GR-S than in rubber. Contrary to rubber, flex cracking is less when repeatedly flexed from zero elongation. Furnace blacks and clays retard crack growth.

Resilience of GR-S is less than for natural rubber and, with vulcanization or aging, usually increases at the expense of flex-life. The German Buna S-3 gave high resilience, good wear, but poor processing. HMF blacks give good processing, improved resilience, and moderate wear reduction.

Tire data show only 10% increase in rolling resistance, where 43% of the rubber hydrocarbon is GR-S.

Improved rubbers are possible and the most promising improvement comes from lower-temperature of reaction, lower polymer conversion, and higher viscosity.

**Silicone Rubber—A New Synthetic Elastomer. *Shailer L. Bass (Dow Corning Corp., Midland, Mich.).***

From the chemistry of silicone rubber it is seen that the inert characteristics of this material are due largely to the strength of the chemical bonds. The basic chemical structure of silicone rubber is a silicon to oxygen linkage that has a bond strength 1½ times as great as the carbon to carbon linkage of organic rubber. This together with the lack of unsaturation in the polymer makes possible in silicone rubber a resilient material that stays elastic from —70° to 500° F., is resistant to weather, chemicals, and oils, and has good dielectric properties.

The physical properties of the silicone rubber measured at room temperature are lower than organic rubber. However, at extreme temperatures or under other difficult conditions where organic rubbers fail, silicone rubber remains relatively unaffected.

Processing is easily accomplished with standard rubber working equipment. Fabrication of the silicone rubber pastes is simplified because no solvent dilution is necessary. Molding cycles for the silicone rubber stocks are rapid so a maximum use is made of expensive molds and presses. For small parts a cycle of 5 minutes or less is possible.

Many new uses for silicone rubbers are in the design or development stage. The full usefulness of silicone rubber is limited only by the resourcefulness employed in using this new heat-stable elastic material.

**The Low Temperature Performance of Butyl Inner Tubes. *R. J. Adams, E. J. Buckler, and G. G. Wanless (Polymer Corp., Ltd., Sarnia, Ontario, Canada).***

Standard Butyl inner tubes in passenger car service, when operated at temperatures below zero Fahrenheit for continued periods, develop buckles which may eventually cause chafing failures. This effect is believed to be due to increase in the viscous modulus compared with the elastic modulus of Butyl at low temperatures. The effect on performance of such factors as tire pressure, casing composition, and acceleration have been investigated, improved formulations consisting of highly plasticized, high molecular weight Butyl have been studied and correlations established between tube performance and physical characteristics such as rebound, rate of retraction, modulus function, and oil viscosity. While commercial evaluation of such formulations is proceeding, other approaches are being studied by Canadian and United States groups, particularly involving polymers which may be brought to a more complete state of vulcanization.

**Preparation and Properties of Buna N Type Copolymers. *J. F. Nelson and B. M. Vanderbilt (Standard Oil Development Co., Linden, N. J.).***

Buna N, a rubbery co-polymer of butadiene and acrylonitrile, was developed by the I. G. Farbenindustrie in the late 1920's. Importation to the United States began in 1937 and the use of Buna N in this country reached a volume of 150 tons in 1939. Of the various grades of Perbunan (Buna N type) marketed by the Enjay Co., an affiliate of Standard Oil Co. (N.J.), that containing 26% to 28% of combined acrylonitrile has received widest acceptance.

In the synthesis of Perbunan by a typical emulsion polymerization process, 0.5 to 0.75 part of aliphatic mercaptan per 100 parts of monomers is used in order to control molecular weight. A mixture of mercaptans in the $C_{12}$ to $C_{16}$ range has been found preferable to the use of any single mercaptan. The molecular weight of the mercaptan is much more critical in a neutral or alkaline emulsion system as compared to one of 2 to 4 pH. Addition of the mercaptan modifier portionwise during the polymerization process results in better utilization of the mercaptan and a co-polymer of better physical properties than is obtained when all the mercaptan is added in the initial feed.

Recent investigation of polymeric type plasticizers of the immiscible type for Buna N has resulted in "pure gum" and loaded compounds of excellent processing properties. Polyisobutylene of 12,000 molecular weight (Staudinger) used in proportion of 10 to 20 parts with 100 parts of Perbunan-26 of 95 Mooney is a typical example. Physical properties of vulcanizates obtained from such blends are in general comparable to those obtained when using miscible ester plasticizers. The polymeric plasticizers are not extracted by oils. In order to get solvent resistance comparable to that of a non-plasticized stock, the nitrile content of the Buna N-polymeric plasticizer blend must be equal to that of a Buna N used singly.

Buna N is finding increasing usage in resins such as polyvinyl chloride and the phenolics. Such blends are of interest both as uncured and as cured stocks. In general, curing results in better physical properties and improved heat and light aging.

**Some New Compositions based on Condensation Rubbers.** ***D. A. Harper, W. F. Smith, and H. G. White (Imperial Chemical Industries, Ltd., Manchester, England).***

By the condensation of a dibasic acid and di-reactive alcohol or amine, linear polymers are produced. Under certain conditions rubbery polymers are obtained and a number of "condensation rubbers" with outstanding physical properties have been described. One of these, a di-isocyanate modified polyesteramide (Vulcaprene A) has been found to be compatible with nitrocellulose, polyvinyl formal, cellulose acetate, degraded vegetable tanned leather, gelatine, and glue. These mixtures can be vulcanized by the formaldehyde-liberating agents used to cure Vulcaprene, and in most cases the curing reaction appears to take place not only with the Vulcaprene but with the other high polymers.

The combination of Vulcaprene and cellulose acetate, and Vulcaprene and degraded leather are of great interest to the leathercloth industry as they can be spread on to cloth to give coatings with outstanding flex and abrasion resistance.

The Vulcaprene/cellulose acetate mixture is of value also as an abrasion- and flex-resisting coating for rubber proofings to give products which, while cheap to produce, are likely to give superior service to pre-war leathercloths. This type of coating can be applied also to paper.

The di-isocyanate modified polyesteramide behaves not only as a novel vulcanizable plasticizer but, in combination with these high polymers, gives new products of major interest to an important branch of the rubber industry.

**Alteration of Neoprene by Polymerization Temperature.** ***H. W. Walker and W. E. Mochel (E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).***

Variation of the temperature at which 2-chloro-1, 3-butadiene (chloroprene) is polymerized with other variables held constant, gives neoprenes with marked differences in the rate of crystallization and dispersion in solvents of the raw polymer and in the physical properties of the vulcanizates. For example, plastic polychloroprene formed at 10° C. quickly crystallizes, forms homogeneous solutions, and exhibits high tensile strength; whereas polymer produced at 100° C. fails to crystallize, only swells in solvents, and has low tensile strength.

These changes in properties appear to be caused by alterations of the structure of the polymer, notably the side-branching, cross-linking, spacing of the chlorine atoms, and possibly cis-trans-isomerism. The structural differences are small in magnitude and difficult to detect. Ozonolysis reveals that a soluble form of polychloroprene, as well as highly insoluble "popcorn" polymer, is at least 93% to 95% 1,4 addition product and X-ray diffraction shows the polymer chains to have essentially a trans-configuration. Infra-red spectroscopy indicates the absence of side vinyl groups.

Branching and cross-linking will explain the decreased rate of crystallization and other properties of the less soluble polymers and it is considered that varying minor portions of 4,1-1,4 or 1,4-4,1 addition or of intramolecular cis-isomers are a factor in the crystallization of the soluble polymers. Technical advantages of the variations in neoprene effected by polymerization temperature are outlined. (NOTE: Read by H. G. Bimmerman in absence of Mr. Walker.)

## Chemistry of Rubber

**Nature of the Sulfur Linkages in Rubber-Sulfur Vulcanizates.** ***G. F. Bloomfield (British Rubber Producers' Research Ass'n., Welwyn Garden City, England).***

Although the general nature of the reaction of sulfur with olefins leads to the expectation that in vulcanized rubber sulfur is present in both intramolecular cyclic linkages and intermolecular cross-linkages, the precise point of attachment of the sulfur in the latter type of linkage has not so far been unambiguously demonstrated.

An extension of the reaction of sulfides with methyl iodide to cover the alkenyl-t-alkyl type of structure shows that trimethyl sulfonium iodide formation is not an exclusive characteristic of diallylic sulfides. It occurs with considerable facility with alkenyl-alkyl sulfides in which the sulfur atom joins an $\alpha$-methylenic carbon atom to a tertiary carbon atom, thus bringing into line the inferences obtained from studies of the reaction of methyl iodide with vulcanizates with recent work on the reaction of sulfur with polyisoprenes.

**The Hydrochlorination of Rubber in Latex.** ***G. J. Van Veersen (Rubber Foundation, Delft, Holland).***

A careful consideration of the influence of solvents on the hydrochlorination of rubber in solution has led to a fundamentally new technical process for the preparation of rubber hydrochloride.

If hydrogen chloride is passed through latex, stabilized with cationic (e.g. Fixanol) or non ionic (e.g. Emulphor O) emulsifying agents, rubber hydrochloride is formed. The rate of reaction, which is slow at normal temperature and pressure, can be increased considerably by carrying out the reaction under pressure.

From the fact that rubber hydrochloride prepared from latex has a chlorine content quite near the theoretical value it may be concluded that hydrochlorination of rubber in latex is not accompanied by cyclization.

**Some Observations on the Oxidation of Rubber in Light.** ***R. L. Stafford (Imperial Chemical Industries, Ltd., Manchester, England).***

An apparatus is described for measuring the oxygen-absorption of vulcanized rubber, either in the dark or under illumination from a controlled light source. The light and dark oxidation curves of four vulcanizates at temperatures of 60° C., 65° C., and 70° C. are examined. Three of the four Vulcanizates were protected by the incorporation respectively of 2% phenyl-$\beta$-naphthylamine, 2% mercapto-benzimidazole, and a mixture of 1% each of the above substances.

The dark reaction over 60 hours duration was in all cases similar, and could be represented by a standard equation. It is shown that the effects of PBN and MBI on the dark oxidation are clearly different throughout the temperature ranges. From a consideration of the initial reaction the decay during storage of the initial oxidizability of the vulcanizates is shown.

In oxidation under light from a relatively weak source at a given temperature, the total absorption is considered as the sum of the dark thermal oxidation appropriate to the temerature, and a light-activated absorption. The effect on the light is then shown to be similar in all cases, the rate of absorption due to light starting from zero and increasing through a maximum to a constant value. By comparison of these constant light rates, it is shown that PBN and MBI have little effect on the light-activated absorption of the control, but that the mixture (PBN, MBI) effectively reduces this absorption. The persistence or development of an enhanced dark rate after illumination is shown to depend upon the period of illumination and the length of dark storage of the vulcanizate.

**Kinetic Analysis of Rubber Halides.** ***G. Salomon, C. Koningsberger, and A. J. Ultee (Rubber Foundation, Delft, Holland).***

A correlation is established between the structure of an organic halide and its rate of reaction with a number of organic bases. Analysis by reaction kinetics, based on this correlation, is applied to the following problems: (i) estimation of the allylic fraction in the chlorination and bromination of natural rubber, (ii) differentiation between a dichloride and a polychloride from natural rubber, (iii) determination of an equilibrium between natural rubber and hydrochloric acid at 130° C. in closed systems, (iv) identification of tertiary chlorides and bromides in natural rubber and allied polymers.

**The Direct Determination of Oxygen in Rubbers. Application of the Unterzaucher Method.** ***W. T. Chambers (British Rubber Producers' Research Ass'n., Welwyn Garden City, England).***

The direct determination of oxygen in organic compounds by reduction with carbon on a micro-scale, by the Unterzaucher method, is described, together with criteria of purity for the carbon and iodine pentoxide reagents employed.

The method has been applied to rubbers and a relative precision of 2% has been obtained, i.e. ±0.01 in the range of 0 to 0.5% oxygen, ±0.02 in the range of 0.5 to 1.0% oxygen, ±0.04 in the range 1.0 to 2.0% oxygen. For compounds containing larger amounts of oxygen the method gives an absolute accuracy of ±0.2 or better.

The method is speedier and yields more accurate results than when oxygen is determined by difference or by hydrogenation. A single determination requires but 30 minutes.

**Kinetic Study of the Oxidation of Rubber. 1.—Some Observations on the Case of Raw Rubber.** ***J. Le Bras and A. Salvetti (Institut Francais du Caoutchouc, Paris, France).***

Following a sketch of earlier work on the oxidation of raw rubber, an improved manometric apparatus is described and illustrated for determining the rate of absorption of oxygen by raw rubber. From fragmentary experiments it is shown to be very difficult or even impossible to obtain reproducible quantitative results. Storage of samples markedly modifies results, which are affected also by the partial pressure of the oxygen, the rubber concentration and its previous history, and experimental conditions. The difference in behavior of antioxidants and oxygen deactivators towards raw rubber is clearly shown, the former having little effect, while the latter remain effective.

## Physics of Rubber

**Refractive Index of Natural Rubber for Different Wave Lengths.** ***L. A. Wood and L. W. Tilton (National Bureau of Standards, Washington, D. C.).***

The refractive indices of a prism of natural rubber have been measured at five different wavelengths in the visible region by the use of a spectrometer. Values of the rate of change of index with temperature at each wavelength have been computed for the range 19.5° to 39.3° C. The Eykman equation, in differential form, is used to calculate the expansivity from the index and its rate of change with temperature. It is concluded with the two-constant Cauchy and Sellmeier dispersion equations are inadequate to represent the data. The dispersion observed for rubber is found to be essentially the same as that of hydrocarbons of similar structure but of low molecular weight.

**Some Applications of Elasticity Theory to Rubber Engineering.** ***R. S. Rivlin (British Rubber Producers' Research Ass'n., Welwyn Garden City, England).***

Some of the implications of the classical elasticity theory of infinitesimal deformations and of the more general theory of the large elastic deformation of incompressible, isotropic materials in the engineering of vulcanized rubbers are discussed. It is not possible to deal exhaustively in a short paper with all the applications which can be envisaged. However, a few of them are indicated in order to draw attention to the desirability of taking these theories into consideration in the design and testing of rubber components. In the paper, only the case of static deformations is considered.

The limitations of the classical theory are first discussed. The manner in which the elastic properties of the material can be described for all large deformations in terms of a stored-energy function is then described. The stress-strain relations, for a general stored-energy function, are given and the stress components associated with a simple shear are calculated. The application of these results to the shear mounting are briefly discussed. The results of applied force-deformation calculations for an idealized torsional coupling are given.

Finally, some general implications of the theory of large elastic deformations with regard to the solution of problems, in which it is desired to calculate the deformation resulting from the application of given forces, are discussed.

**The Degree of Crystallization in Natural Rubber.** ***J. M. Goppel (Rubber Foundation, Delft, Holland).***

An improved X-ray technique has been worked out to determine the degree of crystallinity in natural rubber. Inaccuracies which sometimes occur in quantitative X-ray measurements were eliminated, and it has been shown that the amount of crystalline rubber both in frozen samples of raw rubber and in stretched vulcanized rubber could be determined fairly accurately. More experiments were carried out and the results are described. These results, which confirm the current views on the problem of crystallization, point to relatively low degrees of crystallization, even in highly stretched rubber and they agree with some other experimental evidence and with a recent theoretical investigation.

**Permanent Set in Vulcanized Rubber.** ***L. Mullins (Research Ass'n. of British Rubber Manufacturers, Croyden, England).***

The "permanent set" of loaded vulcanized rubber is shown to be almost entirely due to the way in which the filler particles are re-arranged by stretching, and is not a property of the rubber molecules. Treatment of these loaded rubbers in such a way as to enhance the orientation of the filler; for example, by heating the rubber to permit flocculation of the filler into agglomerates or chains and then cooling before stretching, or by stretching the rubber repeatedly, will increase the set. Conversely the set can be decreased by treating the rubber in a manner which enables or causes the "filler structure" producing set to disappear; for example, by heating the rubber after it has been stretched, by the incorporation of plasticizers, or by stretching the rubber at right angles to the extension used to produce the set.

Thus the so-called "permanent set" is not permanent at all, and is not due to plastic flow of the rubber, as is frequently asserted, unless the rubber is grossly undercured; in fact, the minimum set found with a range of cures on a loaded stock represents a point where the plastic flow has been reduced, but the "filler structure" caused by heating has not yet completely formed. The "final" value of the set in any experiment is an equilibrium point reached between the relatively weak intermolecular bonds which oppose recovery, on the one hand, and the thermal forces which tend to restore the original shape, on the other. This equilibrium can be altered by raising the temperature when the set assumes a smaller value. These considerations also account for a number of phenomena hitherto found perplexing.

**Load Deflection Factors in the Design of Rubber Suspension Units.** ***H. L. Jenkins and D. H. D. Cooper (Dunlop Rubber Co., Ltd., Birmingham, England).***

One of the major difficulties in the mathematical design of rubber suspension units is the absence of proportionality between applied compressive stress and the resulting strain. It is, however, possible to simplify to some considerable extent the nature of the problems involved, by the use of the equation $W = k\ (L - {}^1/L^2)$. In this equation—from the statistical theory—W is the load, L the extension ratio measured in the direction of the load and k a constant, identified by the statistical theory as the rigidity modulus. k can be determined by means of lubricated end compression tests on samples of any cross-sectional area A.

The actual value obtained for k from a series of tests depends

to some extent upon the load history pattern used for the tests. In laboratory testing the choice of pattern is limited either by the size of product to be tested or by the testing equipment to be employed. The constant rate of deformation pattern is used with most automatic testing machines. Results so obtained cannot safely be used to predict deflections produced by other forms of load history. To overcome this difficulty a new testing machine has been designed which enables any load history pattern to be used and which greatly facilitates the obtaining of long-term results.

In practical applications of rubber to engineering components the simple law $W = kA\ (L - {}^1/L^2)$ used for lubricated end compressions can be written in the more general form $W = kf(x)$, in which x is the deflection resulting from load W. In this form the term $f(x)$ is a function of the deflection and includes factors for the size and shape of the component and for bonding or other constraints introduced into the system. It has been called the "Shape Function." The Shape Function for any product, in a compound for which k has been determined by a lubricated end compression test, can be obtained from a stiffness test on the product.

**Free Retraction of Elongated Rubbers.** ***B. B. S. T. Boonstra (Rubber Foundation, Delft, Holland).***

The speed of retraction of the ends of elongated rubber rings relative to each other for a number of elastomers was measured at room temperature by a comparatively simple method. The results plotted as elongation versus time curves indicate that the mechanism of retraction is complicated and cannot be described by a simple mathematical equation. In the present case the so-called "permanent set" plays a part in the retraction velocity. A mathematical equation is given to account for this phenomenon. Elasticity is judged in terms of speed of retraction and "permanent set."

**Experimental Methods in the Osmometry of Dilute Rubber Solutions.** ***H. W. Melville and C. R. Masson (University of Aberdeen, Aberdeen, Scotland).***

A thermostated Fuoss-Mead osmometer for measuring the osmotic pressures of polymer solutions by the dynamic method is described. The technique of preparation of bacterial cellulose membranes for use with polymers of a wide range of molecular weights is given, and the precautions necessary for work in dilute solutions are illustrated. In particular, the dynamic method of Fuoss and Mead is reviewed in the light of results obtained using viscous rubber solutions. The construction of a modified, temperature-insensitive osmotic balance is described.

## Testing and Analysis

**Tear Resistance of Vulcanized Rubber.** ***H. A. W. Nijveld (Rubber Research Institute, T.N.O., Delft, Holland).***

The method now used at the Rubber Research Institute T.N.O. (Delft) for the determination of the tear resistance of vulcanized rubber has been described in detail. The tearing test has been studied further. The influence of the thickness of the sample on the tear resistance has been investigated and some experiments have been carried out to give an explanation of this influence. Further experiments indicate that at the moment of tearing an elongation is reached locally practically equal to the elongation at break of a standard tensile test. Comparison of the angle tear test with the above method leads to the result that the Delft method is to be preferred.

**Tear Initiation and Tear Propagation.** ***J. M. Buist (Imperial Chemical Industries, Ltd., Manchester, England).***

Tear initiation and tear propagation are of equal importance to the rubber technologist and both phenomena must be studied. The angle tear method gives a measure of tear initiation whereas the crescent and I.G. tear methods are tear propagation methods. The angle method, therefore, should not be considered as an alternative to the crescent method. On grounds of reproducibility of test results, there is little to choose between these two, but experimental data shows that the stress concentrations in the angle test piece are too high with rubbers containing non-black fillers, and the method has practically no discriminating power with these compounds. The suggestion is made that the un-nicked crescent test-piece should be used in preference to the angle test-piece for tear initiation measurements and the nicked crescent used, as at present, for tear propagation measurements.

Tear tests have been classified as group (i) tests (direct tearing) and group (ii) tests (tearing perpendicular to the direction of stretching), but it is now pointed out that the classification may alter during testing if knotty tearing occurs. The case where a knotty tear produced "fibering" in the test piece is explained on the hypothesis that the cohesive forces between fibers reach a limiting value before the limiting value of the breaking strength of a fiber is reached.

Practical evidence of non-uniform stress distribution throughout the thickness of tear test-pieces has been found, and the existence of a maximum shear stress in subsurface planes is illustrated. The experimental results suggest that as the strength of the material is increased so the effects of the maximum shear stress are reduced. Differences in the mechanism of tearing compounds containing different fillers (e.g., China Clay, whiting, treated chalks, zinc oxide, and various grades of carbon blacks) have been noted.

**The Meaning of Test Results.** ***R. G. Newton (Research Association of British Rubber Manufacturers, Croydon, England).***

Most rubber technologists now realize that the "meaning" of a test result, in the sense of whether it is significantly different from a similar result or not, is best determined from the "errors" of test by the use of statistical methods, and this has led to an interest in laboratory testing "errors." It is, however, not generally realized that the variation between results from different laboratories is often much larger than would be expected from the testing errors.

Few test-methods have been examined for inter-laboratory variation, and large-scale cooperative programs are urgently required to show which tests are most subject to this trouble. An alternative, but less satisfactory, suggestion is to form a central "pool" of test-specimens, thus enabling laboratories to carry out tests on material with known properties whenever they wish and thereby improve inter-laboratory standardization.

Another feature of the statistical treatment of data which is sometimes overlooked in considering the "meaning" of a test-result is that a test-method may have a small "error," yet be of little value because it is insensitive, having small power of discriminating between different materials; attention is drawn to examples of poor discrimination.

Laboratory tests have their fullest "meaning" when they correlate with the behavior of rubber in service, and hence the physical aspects of laboratory testing must be improved from two points of view; on the one hand the standardizing procedures must be improved so that the excessive inter-laboratory variation is reduced and, on the other hand, correlation with service behavior must be increased. Both of these problems are discussed and suggestions are made for overcoming some of the difficulties.

**The Interpretation of Plasticity Measurements.** ***J. R. Scott and R. W. Whorlow (Research Association of British Rubber Manufacturers, Croydon, England).***

After consideration of the various factors whose influence must be included in any complete assessment of the fundamental flow properties of uncompounded raw rubber, a comparison is made of results from various instruments. It is shown that a plot of log. (shear stress) against log. (strain rate) is substantially straight at low shear rates but may be markedly convex to the log. stress axis at higher rates.

Reference is made to the limitations of the methods of Scott for the interpretation of the results of parallel-plate compression tests; attempts to apply the Nutting equation to the large strains in the usual compression tests with rubber are shown theoretically, and by experiments on materials of known characteristics, to be invalid.

Consideration of the instruments available for factory control purposes shows that the one figure obtained from conventional tests is inadequate for the evaluation of a new mix or even a new plasticizing or mixing technique, and alternative

procedures are considered; for the control of nominally identical batches a single figure may be adequate.

Finally, the essential requirements for research and control instruments are compared, and available instruments in each group surveyed in the light of the earlier discussion.

**A Tackmeter For Rubber Testing.** ***E. W. J. Beaven, P. G. Croft-White, P. J. Garner, and G. Rooney ("Shell" Refining and Marketing Co., Ltd., Thornton Research Centre, Chester, England).***

An apparatus has been developed which enables quantitative determinations of the relative tack values of various rubber compounds to be made, using either short-period cyclic loading or long-period loading of the contacting rubber surfaces. Examples are given of the operation of the instrument and of results with typical tire tread and extrusion compounds.

## Natural and Synthetic Rubber Latices

**The Mechanism of the Creaming of Latex.** ***W. S. Davey and K. C. Sekar (Rubber Research Institute of Mayala, Kuala Lumpur).***

The aggregation of rubber particles is a prerequisite for creaming, leading to an agglomeration of the small globules into clusters and by increasing their effective size, also their rate of upward movement through the serum.

The theory that creaming involves the adsorption of the creaming agent on the rubber particles is considered incorrect; experimental evidence is given that adsorption leads to larger proportions of agent being required to effect creaming than when there is no adsorption.

The preferred theory that creaming agents act by desolvating (i.e., dehydrating) the protein protective layer, thereby reducing repellent forces between the particles, is supported by other experiments.

**Fresh Hevea Latex: A Complex Colloidal System.** ***Miss L. N. S. Homans and G. E. Van Gils (Netherlands-Indies Institute for Rubber Research, Buitenzorg, Java).***

Fresh Hevea latex is a complex system containing two dispersed "phases," e.g., (1) rubber globules, and (2) Lutoids, i.e., small irregularly shaped, viscous colloidal bodies.

The lutoids dissolve in ammonia and other alkalies, coagulate when the latex is diluted with water, but retain their form if the latex is diluted with salt solutions of certain concentrations.

By centrifuging, the lutoids are collected at the bottom of the tube as a separate layer with a sharp boundary. After separation, the fractions (now called the yellow and the white fractions) may be examined separately. Their properties are reviewed.

The importance of the lutoids for the general properties of the latex is discussed.

**Studies in the Coagulation of Preserved Latex by Sodium Silicofluoride.** ***E. A. Murphy, E. W. Madge, and D. W. Pounder (Dunlop Rubber Co., Ltd., Birmingham, England).***

This paper describes extended experimental work on the gelling behavior of sodium silicofluoride, particularly as exemplified by the pH at which gelling takes place.

The influence of zinc oxide, surface-active substances, and the nature of the latex on the gelling pH is examined and tentative hypotheses are put forward as to the significance of the values obtained in relation to other tests for the chemical stability of the latex, such as the KOH number and Z.O.T. value.

Some further evidence is adduced for the dual character of the sodium silicofluoride gelling phenomena supporting the possible contribution of silicic acid to the formation of the gel.

**The Control of Undesirable Viscosity Increases in Latex Compounds.** ***C. F. Flint (Imperial Chemical Industries, Ltd., Manchester, England).***

A latex stabilizer of the non-ionogenic class, consisting of a fatty alcohol-ethylene oxide condensate, similar in chemical type and technological properties to Emulphor O (I.G.), is shown to be effective in controlling "zinc oxide effect" thickening and similar undesirable increases in the viscosity of compounded latex mixes, e.g., in the presence of active accelerators under conditions where an older and better known stabilizer of the anionic synthetic detergent class is not adequately effective. The proposed stabilizer may be effective in as low an amount as ¼% on the rubber and the material actually used in the experimental work was Vulcastab LW.

**The Preparation and Properties of Highly Purified Rubber.** ***G. Martin (London Advisory Committee for Rubber Research, Ceylon and Malaya, London, England).***

A method is described of obtaining highly purified Hevea rubber, 99.9% pure hydrocarbon, by addition of soap to ammonia-preserved latex to displace the protein from the rubber particle surfaces, followed by repeated creaming, coagulation with acetic acid, and extraction with acetone. Prevention or limitation of oxidation of the pure hydrocarbon was obtained by work in the dark, or by treatment of the latex with pyrogallol and extraction with pyrogallol in acetone. Results are given on the vulcanization behavior of highly purified rubber, showing marked improvement in resilience, while there are remarkable differences in the mechanical properties of vulcanizates from sol and gel fractions in some mixes.

**The Possibility of Using Tannins as Coagulants for Natural Latex.** ***H. A. Leniger and G. Verhaar (Experiment Station, West-Java, Buitenzorg, Java).***

War-time scarcity of coagulants in the N.E.I. led to examination of tannin extracts as possible substitutes. Tannins of tea leaf and of the bark of *Acacia decurrens* were selected, and the extracts were obtained simply by stirring the materials in large bottles with cold or hot water, with a view to a process practicable on the estates.

From numerous coagulation trials it was decided that the use of tannin extracts is feasible, with some disadvantages in particular cases, and that tannins mixed with acetic acid save both acid and money at the cost of increased complications. Tannins, however, cannot be recommended except for emergency or unless some special properties of the rubbers are found.

**The Degree of Swelling of Natural and Buna Latex Films in Water.** ***O. Bachle (Central Rubber Laboratory, Farbenfabriken Bayer, Leverkusen, Germany).***

It has been shown that the determination of the swelling of latex films is obscured by extraction which takes place at the same time.

The disturbing effect of extraction can be avoided either by swelling in water vapor, or preferably by employing the "short swelling" technique. This provides a simple method of testing and gives more reliable results.

Films prepared from synthetic latex (Igetex SS and NN) were found to be more resistant to water than those made from natural latex when tested by the short swelling method. The opposite result is obtained by using the usual method of determining swelling, and the reasons for this difference in behavior are discussed.

A slight but insignificant improvement in resistance to water of the film can be obtained by the dialysis of the latex.

## Compounding Ingredients—General

**Theory of Filler Reinforcement. II.** ***Eugene Guth (Polymer Physics Laboratory, University of Notre Dame, Notre Dame, Ind.).***

Modulus-type properties of loaded rubber depend mainly on the shape and the concentration of the filler particles and are almost independent of the size and the surface characteristics of the filler. The author's theory of these properties is patterned after the theory of viscosity of suspensions and implies non-specific wetting between rubber and filler particles, permitting considerable mobility of the filler particles in the rubber. Such mobility is in agreement with studies of the electrical conductivity of carbon black loaded stocks and of the adsorption of gases by carbon blacks.

Fillers with spherical particle shape like calcium carbonate and P-33 (which do not form chain-like structures) obey the theoretical equations for spherical particles. Fillers like the high

modulus and the channel blacks whose primary spherical particles agglomerate into chain-like secondary particles obey theoretical equations for the secondary particles characterized by a shape factor. The assumed chain formation and the values for the shape factors are in approximate agreement with conclusions from electron micrographs.

Experimental arguments are given for the validity of the theoretical equations up to 25% volume concentration, which is the usual technical loading. The agreement between theory and experiment is within the rather large error caused by non-uniformity between and within the test samples and in some work by the use of commercial testers, and the difficulty of comparable vulcanizations.

Refinements of the theory are introduced including possible solvation, difference between the modulus of rubber in absence ("gum" stock) and in presence of the filler particles, and various degrees of wetting from non-wetting to strong wetting (implying specific chemical bonds between rubber and filler). The above mentioned sources of error in the experimental work prohibit safe conclusions about the necessity of introducing such refinements.

The experiments discussed include new measurements of stress-strain properties of loaded vulcanized stocks and of the Mooney viscosities of unvulcanized rubber-filler mixes and a discussion of the pertinent literature. For the dielectric constant of stocks loaded with fillers of spherical primary particle shape, a simple formula is derived. (NOTE: In the absence of Dr. Guth, this paper was presented by Dr. L. H. Cohan.)

**Light Phenomena on Elongating Vulcanized Rubbers.** ***A. Van Rossem (Rubber Research Institute T.N.O., Delft, Holland).***

A description is given of a light phenomenon, first observed by W. C. Smith, when carrying out tear tests on some loaded vulcanized rubbers in a dark room. This phenomenon has been studied more systematically by high speed extension tests.

It appeared that this light effect had nothing to do with the choice of accelerators, but with the compounding ingredients of loaded vulcanized rubbers. In general, those compounding ingredients which belong to the filler class, such as whiting, talcum, and ground barium sulfate, show this light phenomenon very distinctly, while vulcanized rubbers with reinforcing compounding ingredients, such as zinc oxide, titanium dioxide, and carbon black, do not show any light effect, when quickly extended. In accordance with this, "Kalite" and "Calcene," which behave as reinforcing compounding ingredients, do not show any light phenomenon.

It seems probable, that on elongating the vulcanized rubbers containing fillers the adhesion of rubber-filler particle is broken and electrical charges appear on an extremely large surface, which lead to innumerable discharges into surrounding vacuoles, causing the general light phenomenon observed.

**Effect of Pigments on Elastomer Properties.** ***Leonard H. Cohan (Witco Chemical Co., New York, N. Y.).***

The dependence of modulus and Shore hardness of loaded elastomers on pigment volume concentration can be quantitatively accounted for to a first approximation up to about 25% to 30% pigment volume concentration. For pigments composed of symmetrical particles equations related to those derived by Guth and Gold or by Vand for the viscosity of a suspension may be used. For asymmetrical (vermiform) particles modulus follows the Guth equation and hardness obeys an analagous equation. The discrepancy noted at very low loadings and associated particularly with natural rubber appears due to the effect of pigment on breakdown of the rubber.

Plasticity is primarily determined by loading, particle shape and degree of agglomerate formation (apparent shape factor), and rubber breakdown. The latter is much more important for plasticity than for properties of vulcanized rubber, which fact explains some of the difficulty previously encountered interpretating plasticity results.

**New Principles in the Manufacture and Use of Factices and Factice-like Materials.** ***K. C. Roberts and J. H. Carrington (Anchor Chemical Co., Ltd., Manchester, England).***

This paper briefly outlines existing methods of manufacturing white and dark factices and then proceeds to describe new work designed to improve the properties of factices, with particular reference to their performance in rubber compounds. Properties covered by the new work include color, free sulfur content, ease of compounding, rate of vulcanization, mechanical properties and aging characteristics of vulcanizates, electrical characteristics. Methods adopted for influencing these properties include (a) use of catalysts and activators, and of partially hydrogenated oils in the manufacture of dark factices, (b) use of castor oil in the manufacture of white factices, and (c) vulcanization of thermally depolymerized rubber in the preparation of a new factice-like material having outstanding properties.

## Compounding Ingredients—Carbon Black

**The Effects of Carbon Blacks on the Viscosity of Rubber.** ***I. Drogin (United Carbon Co., Inc., Charleston, W. Va.).***

During the initial stage of mixing in a Banbury various carbon blacks and non-carbon pigments in rubber, the viscosity of the mix will be governed largely by the properties of the pigment. Under like conditions of mixing, particle size, surface, shape, structure, and adsorptive capacity chiefly determine the results. The viscosity of the one-minute mix of carbon blacks produced in a related process will show increasing values with an increase in surface area, oil absorption, DPG adsorption, and a decrease in the nigrometer index of the pigment.

The greatest change in viscosity takes place in the first four minutes of the mixing process. The viscosity decreases more in the presence of a fine particle pigment than in the presence of a coarser one. A mathematical expression is suggested which can be fitted to the viscosity changes for a particular pigment. Different types of carbon blacks can be made to produce the same viscosity during initial stages of mixing with rubber by varying their loading. Viscosity measurements likewise reflect the extent of wetting and progress of dispersion of each pigment in the rubber.

The carbon black with the largest particle size appears to be much better dispersed at the end of one minute of mixing than the carbon black of the smallest particle size. There is a wide spread in the viscosity produced by these two blacks in the one-minute mix. The effect of mixing temperature on the viscosity of rubber during its initial stage of mixing with carbon blacks of different particle size is probably slight, since the temperature rise is but 10° F. Some of the non-carbon pigments produce in the initial stage of mixing a higher viscosity than that caused by some SRF blacks, but progressive milling results in lowering the viscosity more than does any one of the carbon pigments.

**The Nature and Activity of Carbon Black Surfaces.** ***W. R. Smith and W. D. Schaeffer (Godfrey L. Cabot, Inc., Boston, Mass.).***

While the electron microscope and adsorption isotherm techniques for evaluating the particle size and surface area of carbon blacks have been particularly valuable in interpreting their behavior in rubber, they also emphasize the fact that reinforcement cannot be interpreted solely on this basis. The activity or nature of the surface must also be considered.

Heats of adsorption offer a means of evaluating surface activity. The differential heats of adsorption have been measured by precision calorimetry for nitrogen, and a series of $C_4$ hydrocarbons on a group of carbon blacks of varying reinforcing ability. Initial sites of high activity were detected. Surface activity decreases with increasing surface coverage. The magnitude of the initial heats parallels the reinforcing properties of the blacks studied. The surface activity and reinforcing ability of an MPC black was found to be greatly reduced by high temperature treatment. These effects were not influenced by the chemical nature of the surface, i.e., the presence of chemisorbed oxygen or volatile matter.

In a further phase of this study the nature of the surface oxide complexes present on carbon blacks have been studied from their emission band spectra in a special vacuum discharge tube. Aldehyde and carboxyl radicals were observed in high concentration. Hydroxyl radicals were also present in nearly equal concentration. These data offer a satisfactory interpretation of the pH properties of carbon black and also should prove of value in interpreting other chemical properties.

**Structures in Rubber Reinforced by Carbon Black. *A. F. Blanchard and D. Parkinson (Dunlop Rubber Co., Ltd., Birmingham, England).***

The stiffening action of carbon black in rubber is due to the structures formed by carbon-rubber bonds and coherent chains of particles. The softening which occurs during pre-stressing cannot be explained by broken chain structure, and it is thought that substantially the whole of this softening is due to ruptured carbon-rubber bonds. Pre-stressing does not affect the characteristic chain structure of the black particles; it breaks relatively weak fortuitous chain structures, formed by reversible Van der Waals forces between particles, which contribute little to the stiffness except perhaps at small stresses.

Heating tends to reform the fortuitous structure owing to the thermal movement of the rubber molecules, which pulls them from between adjacent particles, so that full contact is established. The majority of carbon-rubber bonds are relatively weak and readily broken by stressing. In addition to these low order physical bonds a comparatively few strong bonds stiffen the rubber considerably at high stresses, and are mainly responsible for increasing the tensile strength and abrasion resistance. Such high energy linkages are possible only at localized areas on the particles.

**The Compounding Significance of Carbon Surface, Structure and pH, *Donald F. Cranor (Binney & Smith Co., New York, N. Y.).***

Three fundamental characteristics of carbon pigments, namely, surface, reticulate chain structure, and pH are described and the broad significance in rubber compounding is discussed. As a class, carbons produced by the furnace process differ from channel carbon in respect to these properties. Differences in vulcanization and other compounding effects are brought out, employing as an example, a newer furnace carbon capable of developing tire tread performance superior to that of channel carbon stocks.

Such furnace carbon is not acidic and, in common with other carbons made by this type of process, does not retard vulcanization. Used in tread loadings, vulcanization proceeds as in an otherwise similar formulation containing no carbon. A difference in vulcanization mechanism is indicated.

Since adjustment of accelerator alone results in loss of quality, possibilities in the way of sulfur reduction have been studied. It is concluded on the basis of experimental data, which are presented, that in the presence of 1 PHR benzthiazyl sulphenamide, 2.25 PHR sulfur is adequate. It is shown that quality is impaired if appreciably less sulfur is employed.

Experimental evidence is included indicating that no less than 3 PHR of zinc oxide should be used and that at least 2 PHR of fatty acid, as stearic, should be present with this very fine furnace carbon. Other considerations necessary to the formulation of a practical compound are discussed with view to the influences of surface and structure. An approach to a formulation suitable for tire treads is outlined.

Suggestions for curative adjustment with blends of channel black and fine furnace carbons are advanced. In view of the present day economics of the carbon industry and the commercial availability of new very high reinforcing furnace carbons, it is suggested that the full possibilities of these now deserve detailed investigation in all branches of the rubber industry where maximum performance is required, and particularly for dynamic reinforcement.

## Factory Processes and Products

**Factors Affecting the Power Consumption of Pneumatic Tires. *R. D. Evans (Goodyear Tire & Rubber Co., Akron, Ohio).***

Power consumption, or rolling resistance, of pneumatic tires continues to receive close attention of tire compounders and designers. The power consumed by the rolling tire is, of course, wasted; it represents an ever-present drain on the fuel supply, and contributes nothing to driving the vehicle. Moreover, this wasted energy is converted into heat which raises the temperature of the tire itself, thereby reducing its ability to resist abrasion, separation, flax fatigue, bruising, and blow-out. In truck or giant sizes, the temperature so developed becomes indeed the limiting factor of tire performance in high-speed intercity, commercial operations.

Numerous factors, some external and some internal, affect to varying degrees the level of rolling resistance, which for passenger sizes currently ranges from 12 lbs. to 20 lbs. per 1,000 pounds of load carried, and from 8 lbs. to 12 lbs. per 1,000 pounds of load for over-the-road commercial sizes.

As for external factors or operating conditions, tire drag is increased by an increase of speed, of load, and of tractive force between tire and road; it is decreased by an increase of inflation pressure. When mounted on a rim approximately 70% as wide as the tire itself, rolling resistance is somewhat less than with either wider or narrower rims.

Rolling resistance is decreased by an increase of temperature, whether caused by the tire's own hysteresis or by ambient conditions. This is a fortunate circumstance because it permits the tire to carry heavier load at higher speed than would otherwise be the case.

As for materials, the nature of the cord used has a relatively small and probably indirect effect. Of much greater influence is the nature of the rubber materials; for tires using all-synthetic rubber compounds, the drag may be 50% higher than if compounded from the best grades of the natural product. (NOTE: This paper was presented by Dr. R. P. Dinsmore.)

**Applications of a High-Tenacity Rayon in the Rubber and Plastics Industries. *D. Finlayson and T. Jackson (British Celanese, Ltd., London, England).***

"Fortisan" has a higher degree of orientation, and a higher strength and modulus of elasticity, than any other form of regenerated cellulose rayon. It is suitable for the construction of mechanical fabrics where strength, resistance to stretch, and dimensional stability are of prime importance. Amongst regenerated cellulosic yarns, it has a position corresponding to that occupied by flax amongst natural cellulosic fibers.

Conveyor beltings made from "Fortisan," in comparison with cotton belting, have 15% more strength, 80% to 140% longer life, 50% to 60% of the weight of reinforcing material, they are easier to handle, have good impact strength, ample ply adhesion, trough well without spillage, and stretch less.

For high-duty belting, "Fortisan" should prove of value, particularly with the use of new constructions permitting the strength of the warp ends to be more fully realized. Examples are given to show that unconventional cloth constructions allow the strength, expressed as the fabric strength/weight ratio, or as tenacity calculated on the warp threads only, to be increased several times.

"Fortisan" tire cords have been used successfully in aero and road tires because of lightness and high impact strength. Examples are given to show the effect of twist on strength and extension.

In phenolic laminates, the use of "Fortisan" instead of cotton for reinforcement results in 25% greater shear strength, and 100% greater tensile strength, cross-breaking strength, impact strength, and modulus of elasticity.

"Fortisan" can be used advantageously in V-belting, transmission belting, footwear, rainwear, fire hose, diaphragms, printers' blankets, rubber treated cords, and support for rubber sheeting.

**The Testing and Use of Man-made Fibres in Tire Construction. *G. Fromandi, (Central Rubber Laboratory, Farbenfabriken Bayer, Leverkusen, Germany).***

The static and dynamic characteristics of high-tenacity viscose rayon have been examined and discussed. Special emphasis has been placed on newly developed fatigue tests in relation to the use of these rayons in car and lorry tires. In this connection the work of Bachle and Dane is specially mentioned.

High-tenacity viscose rayon is definitely superior to cotton for the construction of tires. Tires made with it have the following outstanding advantages: (1) Better tensile strength characteristics especially at high temperatures—hence thinner, lighter and more flexible carcasses can be used; (2) Better temperature balance on the road as a result of more favorable hysteresis behavior as well as reduced wall thickness; (3) Higher fatigue resistance; (4) Smaller resistance to rolling.

On account of these superior mechanical and thermal properties, tires can be made with longer working life and a greater safety factor. These improvements in technical efficiency and

*(Continued on Page 516)*

# The Effect of Pigments on the Hardness of Natural and Synthetic Rubbers

By LEONARD H. COHAN and ROBERT E. SMITH
*Technical Service Laboratory, Witco Chemical Co., New York, N. Y.*

WITHIN the last few years, instruments such as the electron microscope have increased our knowledge of the fundamental properties of pigments so that it is now possible to predict, at least semi-qualitatively, some of the properties a pigment will produce in an elastomer.

A previous paper *(1)* dealt with the possibility of calculating the modulus of a stock over a wide loading range from a knowledge of the nature of the pigment used and a single parameter which can be determined from the modulus at a single loading. This paper extends the previous work to a similar calculation for Shore A Hardness. Hardness is very closely related to modulus and is, in fact, essentially a compression modulus, so that theories which apply to modulus may also be applied to hardness.

The following equations for the modulus of an elastomer containing symmetrical pigment particles (I) and rod-shaped particles (II) have been shown to agree fairly well with experimental values even at commercial loadings *(1)*:

$$\text{I} \quad M = M_o (1 + 2.5V + 14.1 V^2)$$
$$\text{II} \quad M = M_o (1 + 0.67fV + 1.62 f^2V^2)$$

where M is the modulus of the loaded stock, $M_o$ is the modulus of the elastic matrix which is approximately the same as the modulus of the corresponding gum stock, V is the ratio of the volume of particles to total volume of the compound, and f, the shape factor, is the ratio of length to diameter for rod-shaped particles.

Equation II appears to apply satisfactorily not only to pigments whose particles are rod-shaped but also to pigments such as furnace and channel carbon blacks the particles of which are elongated, irregular chains of approximately spherical units.

## Equations Relating Hardness to Loading

Since the Shore scale is not graduated directly in compression modulus units, a conversion relation must be determined in order to apply equations I and II. ASTM specifications on hardness *(2)* includes a calibration chart showing the relation between Shore A readings and total load on the indentor in grams. If the units of load are changed from grams to pounds per square inch, we obtain a straight line, equation (a) in Fig. 1.

L is load in pounds per square inch and S is Shore A Hardness. The Shore scale is in units of thousandths of an inch and measures the retraction of the indentor into the instrument. The relation between Shore A Hardness and indention is given by equation (c) in Fig. 1, where I is indentation in thousandths of an inch.

In the lower half of Fig. 1 the solid line corresponds to equation (c). The points are the experimentally measured values of I at various hardness readings for the particular Shore durometer used in this study. Equation (b) in Fig. 1 expresses the actual relation between I and S; however, the difference between (b) and (c) is within two hardness units and the more general equation (c) has been used throughout.

Dividing equation (a) by equation (c), we obtain the following relation between compression modulus, L/I, and Shore A Hardness

$$\text{III} \quad \text{Compression Modulus} = \frac{L}{I} = \frac{23S + 144}{100 + S}$$

When $\frac{L}{I}$ is plotted on semi-log paper against S, the resultant curve is a straight line having the equation

$$\text{IV} \quad \log \frac{L}{I} = 0.02S + 0.44$$

Over the hardness range 10 to 90, equation III may be approximated within one hardness point by equation IV which is somewhat easier to handle and, therefore, has been used in the calculation below.

If it is assumed that Hook's law is obeyed over the small compression range involved in hardness measurements, L/I is independent of I and may be substituted for M in equations I and II. We then obtain for pigments having symmetrical particles

$$\text{V} \quad S = S_o + 50 \log (1 + 2.5V + 14.1V^2)^*$$

and for elongated particles

$$\text{VI} \quad S = S_o + 50 \log (1 + 0.67fV + 1.62f^2V^2)^*$$

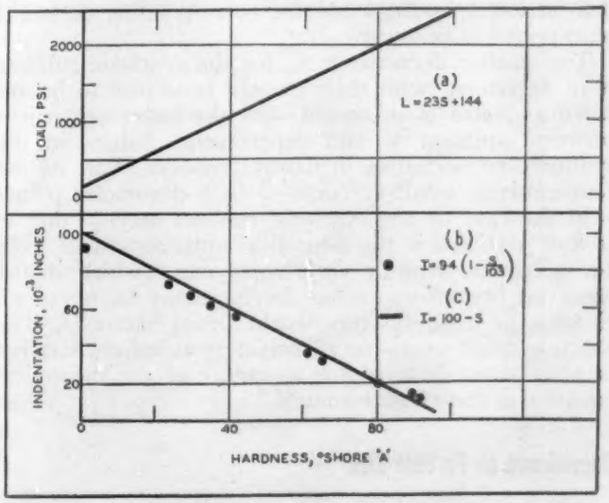


*FIG. 1—Dependence of Shore "A" scale on load and indentation.*

* Corresponding equations obtained with equation III instead of equation

$$\text{Va} \quad \frac{S + 6.3}{100 - S} = \frac{S_o + 6.3}{100 - S_o} (1 + 2.5V + 14.1V^2)$$

$$\text{VIa} \quad \frac{S + 6.3}{100 - S} = \frac{S_o + 6.3}{100 - S_o} (1 + 0.67fV + 1.62f^2V^2)$$

TABLE I

| Filler | P-33 | Continex SRF | Continental AA | Continex FF | Continex HMF | Continex FF |
|---|---|---|---|---|---|---|
| Smoked Sheet | 100 | 100 | 100 | 100 | 100 | — |
| GR-M | — | — | — | — | — | 100 |
| Mercaptobenzothiazole | 1 | 1 | 1 | 0.5 | 1 | — |
| Phenylbetanaphthylamine | 1 | 1 | 1 | 1 | 1 | — |
| Phenylalphanaphthylamine | — | — | — | — | — | 2 |
| Sulfur | 3 | 3 | 3 | 3 | 3 | — |
| ELC Magnesia | — | — | — | — | — | 4 |
| Zinc Oxide | 3 | 3 | 3 | 3 | 3 | 5 |
| Stearite | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 0.5 |
| Witco No. 20 Softener | 3 | 3 | 3 | 3 | 3 | — |
| Light Process Oil | — | — | — | — | — | 5 |
| Carbon Black | 0–200 | 0–150 | 0–150 | 0–150 | 0–120 | 0–140 |
| Press Cured at (°F.) | 287 | 287 | 290 | 290 | 280 | 338 |

where, as before, V is the volume concentration of pigment and f is the ratio of the length to the width of a rod-shaped or chain-like pigment. S is the Shore A Hardness at the loading V, and $S_o$ is the Shore A Hardness of the unpigmented matrix.

$S_o$ does not necessarily equal the hardness of the corresponding gum stock. In Fig. 2 the values of $S_o$ (matrix hardness) at various loadings for Witcarb R in GR-M, GR-S, GR-I and smoked sheet have been calculated from equation Va and the experimental hardness values for S. The rubber formulations employed are available elsewhere *(3)*. $S_o$ for smoked sheet decreases sharply from the gum stock value to a minimum at a volume concentration of 25 to 30%, while for the synthetic rubbers the decrease is less than half as great. The $S_o$ values for all the elastomers rise rapidly above 30% volume concentration corresponding to about 150 parts Witcarb R. (If equation V is used instead of Va, very similar curves are obtained but the decrease in $S_o$ is less pronounced.)

The initial decrease in all cases may be related to the fact that the breakdown of the rubber matrix on milling probably increases as the loading and, hence, the stiffness of the stock increases. Observations on the rate of decrease of Mooney plasticity as a function of rubber mastication likewise show that finer pigments which form less plastic compounds also cause more rapid breakdown of the rubber as indicated by a faster rate of decrease in plasticity *(4)*. In other words, the rubber matrix is degraded somewhat more at higher loadings than at lower loadings and the corresponding $S_o$ might be expected to be lower.

The smaller decrease in $S_o$ for the synthetic rubbers is in agreement with their greater resistance to breakdown and also is in accord with the better agreement between equation V and experimental values in the synthetic rubbers than in natural rubber. (Part of the comparatively small decrease—5 to 6 durometer points—in the case of the synthetic rubbers may be due to lack of precision in the theoretical equation so that, even for polyisobutylene or vinyl copolymers, which should show no breakdown, some decrease may be observed. Studies in these systems would be of interest). The sharp increase in $S_o$ for all polymers at volume concentrations above 30% is due to failure of the theoretical equation at these high loadings.

## Dependence on Particle Size

Equations V and VI indicate that, when hardness is determined under conditions at which $S_o$ is constant, the results should depend solely on volume loading and particle shape and should be independent of particle size. If results are compared at equivalent state of cure (cure giving maximum tensile was used throughout this study) and at constant V, $S_o$ should not vary appreciably and, therefore, S should be approximately constant. Fig. 3 indicates this condition is obeyed within a fairly narrow hardness range in both natural and synthetic rubbers for a series of channel blacks of average diameters between 10 and 35 mu.

Formulations for the channel black stocks have been published in a previous article *(1)* in which it was also shown that no consistent trend occurs for hardness in smoked sheet and GR-S for a series of calcium carbonates of widely different particle size. The comparative independence of particle size for calcium carbonates is further illustrated in Fig. 4.

## Dependence on Loading (Symmetrical Pigments)

In Fig. 4 equation V is compared with experimental hardness values obtained at various loadings for two calcium carbonates. The first, Witco AA Whiting, has an average particle size of 4 microns; the second, Witcarb R, a fine precipitated calcium carbonate, has an average particle size of about 0.05 microns. In spite of the wide difference in particle size, both the Whiting and the Witcarb R experimental values follow equation V fairly well except at very low loadings.

This deviation appears to be related to the breakdown of the rubber matrix in the loaded stock as discussed above. Since $S_o$, the matrix hardness, was determined by averaging values for the loaded compounds up to V equal to 30%, this value for $S_o$ is too low for the gum stock and for very low loadings. In Fig. 5 for AA Whiting in GR-S and in Fig. 6 for Witcarb R in GR-I, GR-S, and GR-M, the experimental points and theoretical curves agree quite well at all loadings up to a volume concentration of about 30%. The formulations for the compounds used in obtaining the data for Figs. 4 and 6 have been reported previously *(3, 5)*. For Fig. 5, 20 parts hard paracoumarone indene resin was used instead of 30 parts in the otherwise identical formulation for Witcarb R in GR-S.

According to the theoretical equation, the chemical nature of the pigment surface should have no effect on the relation between hardness and loading. Electron micrographs indicate that thermal blacks show comparatively slight aggregation. A fine thermal black such as P-33 may, therefore, be considered to consist of approximately symmetrical particles. The marked difference between carbon and calcium carbonate surfaces

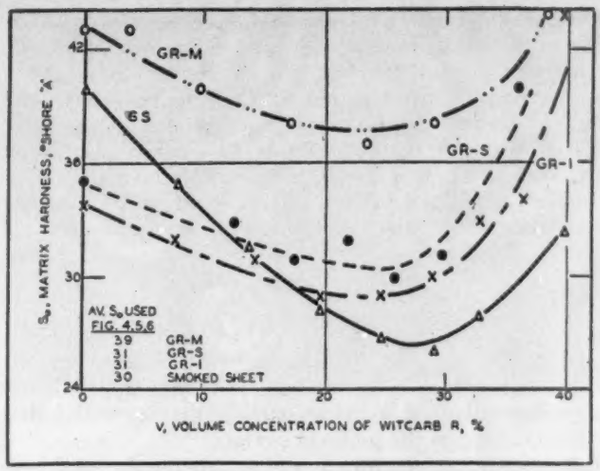


*FIG. 2—Dependence of matrix hardness on volume loading.*

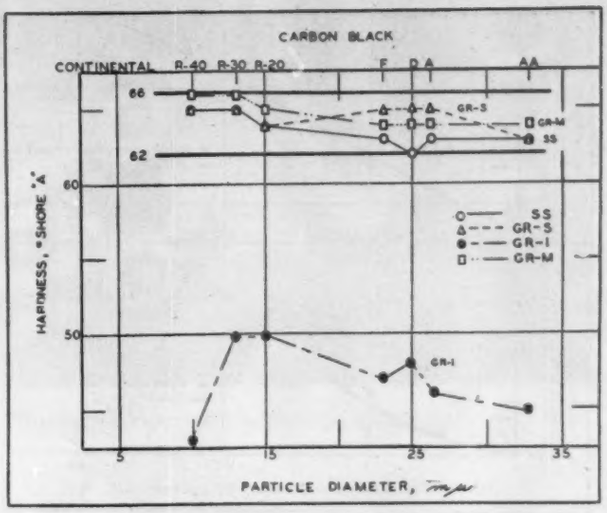


*FIG. 3—Hardness vs. average particle diameter channel blacks.*

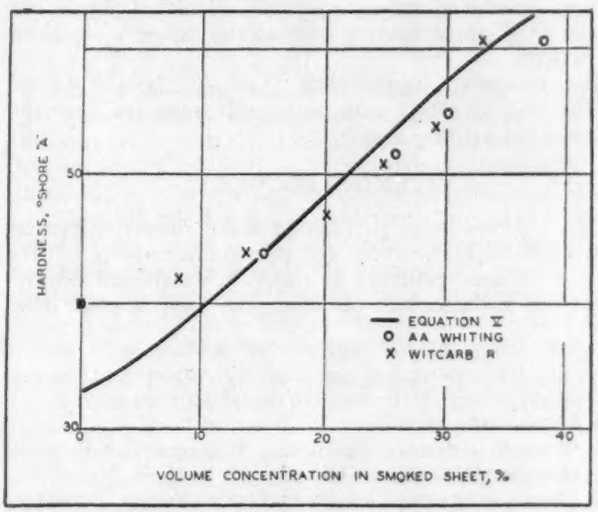


*FIG. 4—Calcium carbonates in smoked sheet*

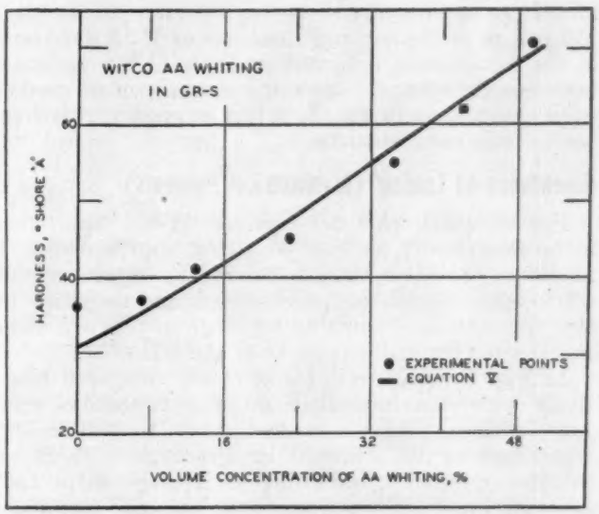


*FIG. 5—Witco AA Whiting in GR-S.*

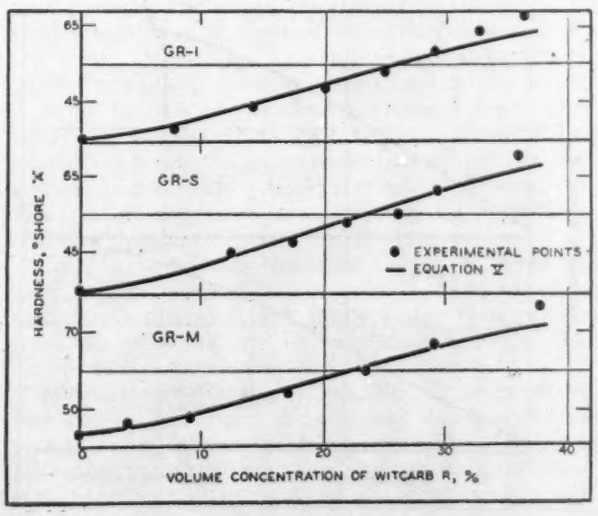


*FIG. 6—Witcarb R in synthetic rubbers.*

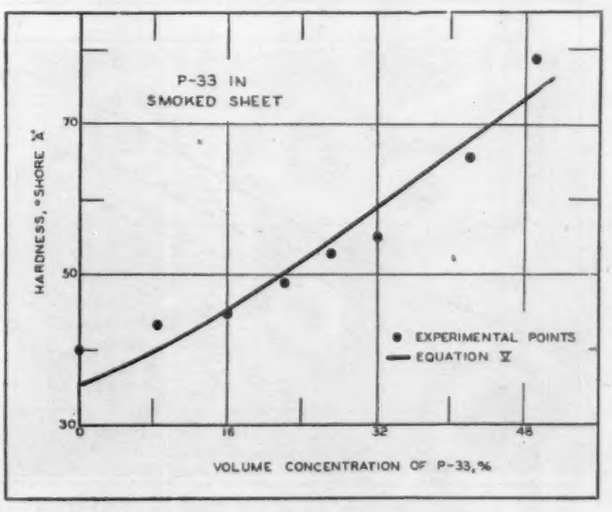


*FIG. 7—P-33 in smoked sheet.*

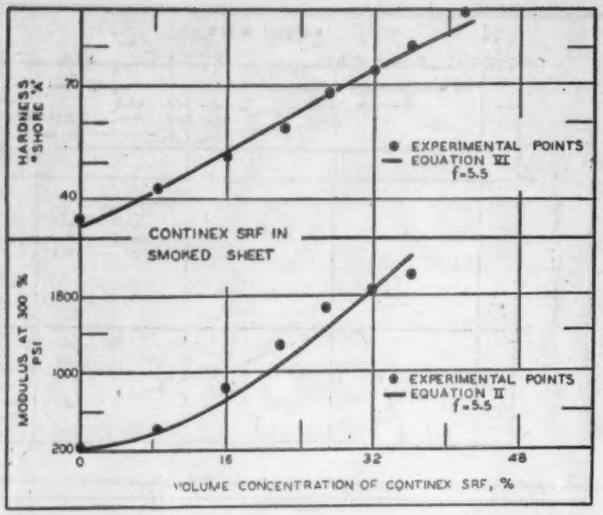


*FIG. 8—Hardness and modulus of Continex SRF in smoked sheet.*

affords an opportunity of testing the effect of the chemical nature of the surface. Loadings of P-33 were tested in the formulation indicated in Table I. The agreement between equation V and the experimental modulus values, as shown in Fig. 7, is just as good as that found for the calcium carbonates.

## Dependence on Loading (Asymmetrical Pigments)

For elongated particles equation II has been shown to be satisfactory, at least to a first approximation for modulus *(1)*. We should, therefore, expect equation VI to apply equally well to hardness and the shape factor, f, found most suitable for a given pigment should be the same for both equations II and VI.

In Fig. 8 equations VI and II are compared respectively with experimental hardness and modulus results for Continex SRF in smoked sheet. In both cases, f was taken as 5.5, which is in agreement with electron microscope studies, indicating an average shape factor between 4 and 6 for this pigment. The base formulation is shown in Table I. The agreement is reasonably satisfactory up to 30% volume concentration.

For Continental AA (EPC) and Continex HMF in smoked sheet (Fig. 9) fairly good agreement is obtained between the experimental data and equation VI when f equal to 6 is used for both blacks. An extensive electron microscope investigation of Continental AA to be published shortly yields an average value between 5.96 and 8.04 for f. A shape factor of f = 6 was also used for Continex FF in Fig. 10, where experimental values in smoked sheet and GR-M follow equation VI closely. Formulations for the above stocks are included in Table I.

## Summary

At equivalent state of cure, hardness (S) depends primarily on pigment volume concentration (V) and particle shape factor (f) and is, to a first approximation, independent of average particle diameter and the chemical nature of the pigment surface.

For pigments composed of symmetrical particles, $S = S_o + 50 \log (1 + 2.5V + 14.1V^2)$ where $S_o$, the hardness of the rubber matrix, may be determined from S at one loading. For most synthetic rubbers $S_o$ varies only slightly with loading and the equation holds throughout the commercial range. The breakdown of natural rubber leads to a decrease in $S_o$ so that satisfactory hardness values may be calculated from the values at a single loading only in the range V equal to 10 to 30%.

For elongated particles, $S = S_o + 50 \log (1 + 0.67fV + 1.62\ f^2V^2)$ with reasonable accuracy over the commercial loading range.

ACKNOWLEDGMENT

The authors wish to express their sincere appreciation to Mrs. T. Newman for preparation of the figures and to various members of the Witco technical department for assistance in obtaining the experimental data.

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Presented before the Division of Rubber Chemistry at the 113th Meeting of the American Chemical Society, Chicago, Ill.

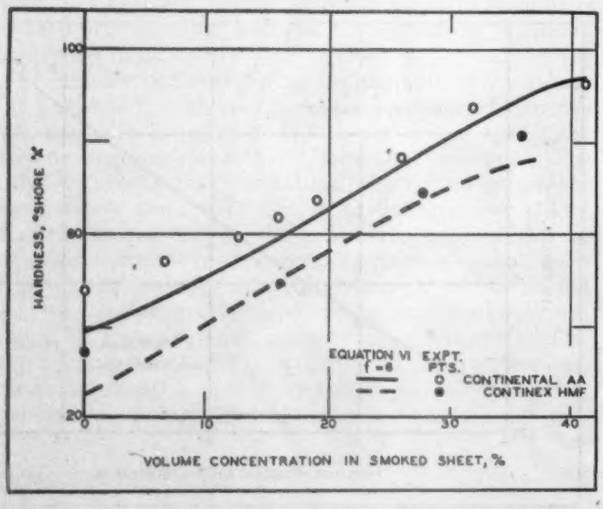



*FIG. 9—Continental AA and Continex HMF in smoked sheet.*

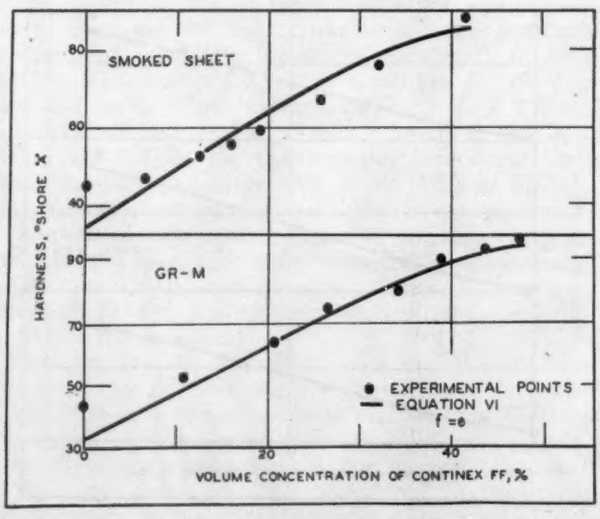
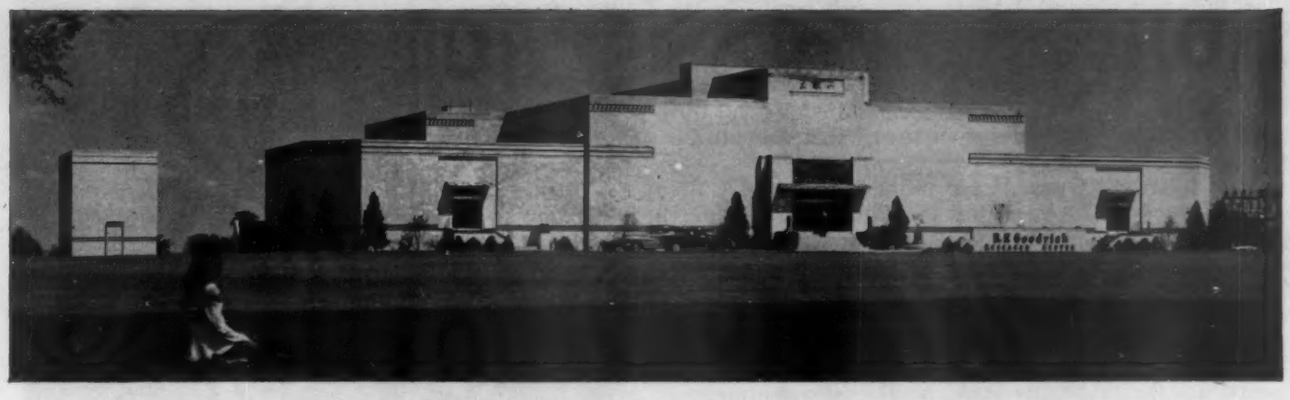



*FIG. 10—Continex FF in smoked sheet and GR-M.*



*Main laboratory building on the new Goodrich Research Center at Brecksville, Ohio.*

# The New Goodrich Research Center

THE newly-completed multi-million dollar Research Center of the B. F. Goodrich Co. at Brecksville, Ohio, located on a tract of 261 acres halfway between Akron and Cleveland, was formally inaugurated on June 15. At the opening ceremonies, John L. Collyer, president of the company, said that "the center is, we believe, the most complete industrial workshop of science now in existence." It utilizes the most precise and delicate instruments now known to science.

Completion of the Center, started three years ago, marks more than a half century of organized research for the company, Goodrich having established the rubber industry's first laboratories in 1895 under the direction of the late Charles C. Goodrich, chemist son of the company's founder.

The site, nearly 20 miles from the company's manufacturing plants at its principal headquarters in Akron, was selected to insure that noise, dirt and vibration do not interfere with the work of the scientific staff, nor with the delicate instruments employed.

Room for possible future expansion is provided, as well as acreage where food and fruit crops will be grown and research conducted on them. The company is already established in the field of agricultural and biological chemicals, and the Research Center will conduct expanded studies in the laboratories, and on the soil itself.

Plans for the new Research Center were first tentatively outlined six years ago. Research heads and other executives visited 26 laboratories throughout the country and conferred with a large number of research directors. Ninety suggested locations were studied before the site was chosen.

Completion of the Research Center, with its vastly improved facilities will speed development of scientific discoveries three or four times faster than previously possible, according to Dr. Howard E. Fritz, B. F. Goodrich vice-president—research.

In addition to probing into the mysteries of crude and man-made rubber, the company will conduct intensive research in such fields as chemicals, plastics, agriculture, horticulture and the application of nuclear energy to rubber manufacturing. Atomic energy's usefulness and effects in rubber and related materials will be studied in one of the center's laboratories.

There are now six buildings and a powerhouse in the Research Center, of an advanced design, using light gray bricks trimmed with horizontal bands of black. These buildings are in the center of a landscaped area of 20 acres.

Two three-story structures, the main research laboratories and the connected engineering research unit, are windowless except for small openings at the ends of hallways, and air conditioned. The air is not only cooled, or heated, but is also filtered and humidified to provide the maximum for human comfort and protection of the precise instruments. Filtering is accomplished by the recently developed precipitrons and humidifying by water spray.

Other units, isolated from main buildings, include one for extremely high pressure research, where 12-inch reinforced concrete barriers protect workers against hazard. Another is for experiments with gases. A stream of fresh air is continuously forced through this building. The third is for storage of volatile solvents, and a fourth for cooling the water for air conditioning.

*View of one section of the main laboratory building at the new Research Center.*

In the main research laboratories much emphasis has been laid on great flexibility. There are 112 separate rooms, each 10 x 26 feet. Partitions of steel can be readily moved so any number of rooms can be converted into a single unit. Any type research and equipment can thus be swiftly handled by changing the size of the workroom.

Gas, electricity, water, steam and air are available for each room. Fluorescent lights built into white ceilings provide illumination without shadows. Walls are painted an "optimistic" green. Floors are laid with two-tone rubber, tile and desks equipped with rubber tops, of the company's manufacture.

Three decorative architectural panels are one of the features of the front entrance to the main building. One symbolizes the rubber molecule, another is a representation of the atom as it is known to science today and the third shows the X-ray diffraction patterns of the principal variety of natural rubber.

Exhibits of finished products which have stemmed from the company's research are a feature of the lobby. Floors are of Koroseal tile and walls decorated with Koroseal-treated fabric.

Adjoining the lobby is the assembly room, which seats 200 and used principally for large meetings to disseminate technical information. Walls are covered with Koroseal-treated fabric and a similar material is used in upholstering the seats. There is a stage, sound system and a screen for projection of movies. Two smaller connecting conference rooms can be made part of the main auditorium by removing their sound-proof partitions.

The technical library, also in the main building, comprises about 10,000 volumes in the fields of physics, chemistry and engineering and is believed to be the largest and most complete owned by any company in the rubber industry. Nucleus consists of bound volumes of complete runs of the most important technical periodicals extending as far back as 1788. Accessibility has been the keynote in planning the library. Individual study alcoves assure privacy for scientists who wish to study without interruption.

Other features of the Research Center include an emergency lighting system operated by storage batteries to provide illumination if power fails; a huge vault in which the most important research documents of the company are kept, including correspondence, original laboratory notes, data sheets and other vital records; a cafeteria which accommodates 125 at one time; complete professional glass blowing; photographic, duplicating, microfilm reading and microfilming services; complete small shops and fabricating facilities, including machine, carpenter, welding, pipe fitting, sheet metal and electrical which can build pieces of equipment of virtually any design needed and a chemical stockroom which serves the researcher pretty much like the shopkeeper serves the housewife.

*Testing radiocativity with a Geiger counter at the new Goodrich Research Center.*

*Watching a chemical reaction at the laboratory. The hooded recess allows all fumes to be swiftly carried away.*

There are now 100 chemists, chemical engineers, physicists and engineers on the staff, of which three physicists and three chemists are women. In addition there are about 125 non-professional personnel. Besides Dr. Fritz, other key people at the Research Center include the following:

Donald H. Cornell, manager of engineering services; Donald B. Stewart, manager of operating and planning; Harry N. Stevens, director of patents and abstracts; Edwin B. Newton, director of technical service; Ross Shearer, manager of physical testing; John M. Davies, director of physical research; Dr. Thomas L. Gresham, director of organic chemicals research; Dr. Waldo L. Semon, director of pioneering research; Dr. Harlan L. Trumbull, director of textile and colloid research; Archie B. Japs, director of chemical engineering research; Arthur E. Juve, director of compounding research, and Carlin F. Gibbs, director of polymerization research.

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Montgomery & Co., Inc., 53 Park Place, New York 7, N. Y., is marketing a **portable industrial elevating table** designed to safely carry and lift a load of one ton. Maximum height from floor is 26 inches. The table is said to be a labor saver in machine shops, tool rooms, mold and die departments, etc.

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A versatile combination of three different handling tools in a single mobile unit for weighing out batches, transporting them about the plant, and dumping them ino furnaces, tanks or hoppers has been announced by Yale & Towne of Philadelphia, Penna. Called the **Portable Batching Scale-and-Dump Combination,** this new truck lends itself to a variety of industrial applications.

# New Strain Tester for Rubber

A new device developed at the National Bureau of Standards conveniently measures strain in vulcanized rubber, in contrast to the conventional tensile testers which determine tensile stress. In this apparatus the strain is measured at a definite time after application of a predetermined stress, while the usual testing method employs essentially the opposite procedure, that is, measurement of stress at a specified strain. Designated therefore a "strain tester," its development followed Bureau investigations which revealed that the new technique combines a higher degree of reproducibility in measurement with an accuracy not previously possible. These investigations were part of a program conducted for the Office of Rubber Reserve on the improvement of physical testing methods for synthetic rubbers.

## Reproducibility of Values

During the past three years both strain and tensile tests have been made at the Bureau on several hundred sheets of various lots of GR-S, GR-I, and GR-M synthetic rubbers. Statistical analyses of these data have shown that variances introduced by the strain test are negligible compared to the variances in different sheets of rubber from the same batch, or in batches from the same lot of polymer. On the other hand, differences introduced by the usual measurements of stress at a specified elongation are of the same order of magnitude as those for different sheets and different batches.

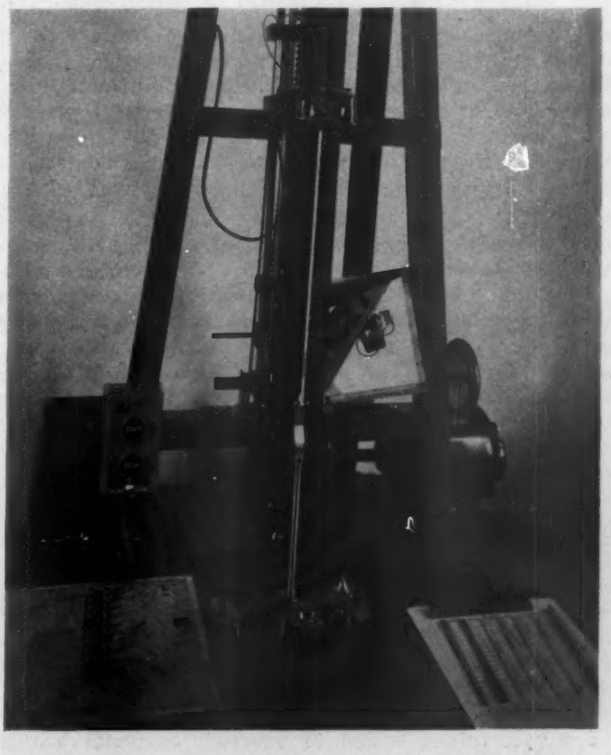
Since 20 specimens for the strain test can be cut from a single test sheet, it has now become possible to detect differences in the properties of rubber from different parts of the sheet, or to study the effect of aging on stiffness or modulus by means of a single test sheet. Furthermore, the relatively large distance between bench marks on the specimens used in the new test and the fact that the test subjects them to a uniform stress for a definite length of time make these specimens desirable for measurements of set. Values determined in this manner are found to be much more reproducible than the usual measurements made after rupture of the specimen.

The strain tester was designed to incorporate this improved reproducibility of measurements and high degree of accuracy in an apparatus suitable for routine testing. The design features responsible for the precision and accuracy are: (1) Observation of bench marks when they are essentially at rest; (2) use of freely suspended weights to attain the desired stress without frictional effects; and (3) increase in the distance between bench marks of four times that employed for the usual dumbbell-shaped specimens. In addition, the various manual operations in the test are simplified.

The tester is composed of two parts, built into a supporting table. One part, above the table, includes a mechanism for extending the specimen, an optical system for observing the upper bench mark on the specimen from a seated position, a mechanism for aligning a millimeter tape with the bench marks, a time cycle controller for regulating the sequence of operations, and a keyboard for selecting the load to be applied to the specimen. Beneath the table is the mechanism for applying the selected load. This mechanism employs 8 solenoids for adding 8 different weights singly or in combinations to a weight assembly attached to the specimen.

The rubber specimens are strips 0.254 inch wide and 6 inches long, cut from the usual 6-inch square test sheet. The specimen die consists of 6 razor blade strips clamped between metal spacers. Thus, 5 specimens are cut in a single operation. The bench marks, placed on the specimens in the usual manner, are spaced 10 centimeters apart. Using a special thickness gage, the average thickness of the specimen between the bench marks is obtained by a single measurement. The gage reading is entered on the keyboard of the strain tester.

After placing the specimen in the grips, the starting switch is pressed, causing the selected weights to be added to the weight assembly and starting the motor which pulls the specimen upward. When the specimen lifts the weight assembly from its support, a switch starts the time cycle controller. At subsequent predetermined intervals this controller (1) halts the upward travel of the specimen by stopping the motor when the weight assembly has been lifted sufficiently to prevent it from coming back to rest on its base as the specimen continues to stretch, (2) signals the operator and lights the lamps in the optical system for observing the upper bench mark and hair line, (3) extinguishes the lamps to pre-



*Rubber strain tester developed by the National Bureau of Standards. This view, taken from the perspective of the operator, shows the optical prism, the rubber specimen in test position, and the mirror in which the upper bench mark is observed. Note also the weight-selector keyboard at the lower left.*

vent late observations, (4) returns the specimen and weights to their starting positions by starting the motor in the reverse direction and (5) stops itself at the end of the cycle.

The strain test is not intended to measure stress-strain properties near or at rupture. For control testing, however, and for much research, a knowledge of the strain for any stress below the region of rupture is sufficient. The improved precision obtained in the strain test warrants a separate determination of the stress and strain at failure in those cases where they are necessary.

An examination of strain data, plotted as a function of the time of cure, reveals a rectangular hyperbola of the form

$$(x-A)\ (y-B)=C$$

This observation suggests that strain at a fixed stress decreases with time of cure according to the laws of a second order reaction and therefore strain is a direct measure of the degree of vulcanization. If t, the time of cure, be substituted for x, and E, the strain or percent elongation, for y, the parameters A, B, and C may be interpreted as vulcanization parameters. In this interpretation A is associated with $t_o$, the time of impending cure or "scotch time"; B with $E_{oo}$, the elongation for infinite cure or a structure factor; and C with 1/k where k is the reaction rate constant.

In the case of materials like GR-M, GR-I, or natural rubber, which crystallize on stretching, the scorch time $t_o$ becomes smaller at stresses where crystallization begins and becomes negative for greater stresses. It is also noted that these parameters are greatly affected by small variations in the test data.

Since data from different test sheets of the same compounded batch and data from different batches of the same lot of polymer show rather large variances, several batches must be tested in order to obtain sufficient data for reliable parameters.

(EDITOR'S NOTE: For further technical details of the above work see the articles on "Strain Tester for Rubber," by Messrs. Holt, Knox and Roth, and "Strain Test for Evaluation of Rubber Compounds" by Messrs. Roth and Stiehler, in the August, 1948, issue of the *Journal of Research*, official publication of the National Bureau of Standards).

## Successful Anti-Waste Campaign Waged by Voit Rubber

HOW to wage an effective war against waste was demonstrated recently by the W. J. Voit Rubber Corp. of New York, Chicago and Los Angeles, manufacturers of the Voit athletic equipment used by thousands of U. S. schools and colleges.

Beginning in November, 1947, the Voit anti-waste campaign began in high gear with plant wide strategy meetings. All executives, managers, and department heads were called to assist in the drive. Planning committees were appointed. Publicity stunts were planned and executed. The company's suggestion plan system was given a powerful shot in the arm by a contest for dozens of cash awards, home appliances, and Voit merchandise.

Voit's anti-waste planning nucleus consisted of the vice-president in charge of production, production manager, standards head, office manager, personnel director and advertising director. Together with certain chosen accomplices these men sprayed every nook and cranny of the main Voit plant with $300 worth of pennies one afternoon during a five minute fire drill when all employees were out of the building.

The effect on the six hundred Voit employes when they re-entered the building might have been that of an explosion. Like locusts plundering Iowa corn they covever every square inch of every building on the premises. No hint was dropped from management explaining the bonanza.

The following morning after speculation had simmered to a boil, each employee received with his time card a bulletin pointing out that valve stems dropped and kicked around the floor, patches of fabric ruined through careless handling, tools damaged through unwise use, rubber soiled or marred, moments lost in loitering or chatting—all represented thousands of dollars in lost pennies scattered wastefully through the plant each year.

Simultaneously, posters were mounted throughout the plant depicting waste as a masked hoodlum with a blackjack protruding from his hip pocket. Each poster contained a jingle like "Hey, Joe, have you read the spec? Well, no, but I will by heck!" Across each poster in large letters: "Waste is a thief! Stop him!"

During the first eight weeks following, material and time losses dropped 20%, production shot up 10%, employee morale was substantially improved.

Daily meetings of all foremen and section leaders the first week, weekly meetings for the next six weeks, contest awards totaling $2,500.00, suggestion box awards on a profit percentage basis, distribution of booklets and leaflets, and publicity follow-up through the Voit house organ, bulletin boards and p.a. system held interest at white heat.

To date over one hundred new methods and techniques have been introduced, ten new machines devised, and waste reduced to the tune of hundreds of dollars per day.

*Die-cut figure emphasized Voit waste campaign.*

# Division of Rubber Chemistry, A. C. S., Meets in Los Angeles on July 22-23

AS PREVIOUSLY announced, a regular meeting of the Division of Rubber Chemistry of the American Chemical Society will be held on Thursday and Friday, July 22 and 23, at the Mayfair Hotel in Los Angeles, California. It will be the first such meeting held on the Pacific Coast and is a supplementary meeting to the regular Spring and Fall meetings of the Division. The Fall meeting of the Division will be held in Detroit from November 8 to 10.

The Los Angeles meeting will feature the presentation of twenty-one technical papers, at three separate sessions. The regular business meeting will be held during the technical session on Friday morning, July 23. The Division banquet will be held at the Biltmore Hotel on Thursday evening, July 22. D. C. Maddy, of the Harwick Standard Chemical Co., is chairman of the Local Arrangements Committee, with banquet arrangements being handled by C. H. Churchill of the Sterling Rubber Products Co.

Immediately following the meeting, the Los Angeles Rubber Group will hold its popular two-day summer outing at Santa Catalina Island and all members and guests of the Rubber Division have been invited to participate in this outing. Mr. Churchill is chairman of the Outing Committee.

Titles and abstracts of the twenty-one papers to be presented at the Los Angeles Meeting, together with their authors and company connections, follow:

**Program of the**

**DIVISION OF RUBBER CHEMISTRY**
**AMERICAN CHEMICAL SOCIETY**

**Mayfair Hotel—Los Angeles, Calif.**
**July 22 and 23, 1948**

*Thursday Afternoon—July 22*

**2:00 P.M.—Opening remarks by Harry E. Outcault (St. Joseph Lead Co.), Division Chairman.**

**2:05 P.M.—Technical Papers.**

*Thursday Evening—July 22*

**7:00 P.M.—Division Banquet, Hotel Biltmore.**

*Friday Morning—July 23*

**9:00 A. M.—Technical Papers.**

**11:20 A.M.—Business Meeting.**

*Friday Afternoon—July 23*

**2:00 P.M.—Technical Papers.**

## ABSTRACT OF PAPERS

### *Thursday Afternoon—July 22*

**2:05 P.M.—Photoelastic Applications in Rubber Technology.** ***James A. Hurry and Douglas Chalmers (Gates Rubber Co., Denver, Colo.).***

Photoelastic applications in analysis and design have had wide and varied use in the study of stresses in rigid bodies. Very limited use, however, has been made of the photoelastic method in the specific problems of rubber technology. In this field considerable complexity is involved because of the large strains encountered and the nature of the stress-strain relationships.

Some of the problems associated with the application of the photoelastic method to rubber products will be discussed briefly. This will include suitable low modulus photoelastic materials, implications involved in large deformations, physical and photoelastic constants of suitable materials, and the necessity of handling non-linearity conditions for quantitative results.

In this paper it is proposed to demonstrate the qualitative photoelastic technique using suitable low modulus materials. Stress in the Winkleman "B" Tear Specimen and in a Gates Modified Graves Tear Specimen will be compared (slides). Extension of the method to quantitative analysis, with reference to the physical and photoelastic constants and the non linearity conditions, will be presented briefly. The use of models cut from sections of molded products will be illustrated. Frozen stress applications using stressed products will be included.

Suggested uses of the method will be given for various types of rubber products.

**2:25 P. M.—Measurements of Mechanical Properties of Rubbers at Audio Frequencies By A Twin Transducer.** ***John D. Ferry, Robert S. Marvin and Edwin R. Fitzgerald (University of Wisconsin, Madison, Wis.).***

Apparatus has been developed for measuring the dynamic viscosity and rigidity of rubber-like solids in small oscillating deformations. A plate rigidly attached between two identical coils in two permanent magnet loudspeakers shears a pair of disc-shaped samples when a driving current is passed through one coil. The output voltage from the other coil is compared in amplitude and phase with the driving current as follows:

The vector difference between the output voltage and the potential drop across a variable resistance in series with the driving coil is measured by a high impedance vacuum tube voltmeter, and by changing the resistance this voltage is adjusted to a minimum value. The minimum voltage reading and the corresponding resistance value are proportional to the imaginary and real parts, respectively, of the complex mechanical admittance of the system.

The method has two advantages over the more familiar resonance devices: (a) the amplitudes of motion, which need not be measured directly, are extremely small, thus minimizing any non-linear effects, or temperature change due to heat dissipation; (b) a continuous range of frequencies, spaced as closely as desired, is available without adjusting masses.

Representative data for the dynamic viscosity and rigidity of a high molecular weight polyisobutylene over the range 60-700 c.p.s. at room temperature will be given. The values for this material, although it is devoid of cross-links, are similar in magnitude to those of a lightly vulcanized rubber.

**2:50 P. M.—A Study of Electrostatic Charges Produced During Mastication of Rubber and GR-S.** ***R. S. Havenhill, L. E. Carlson and J. J. Rankin (St. Joseph Lead Co. of Penna., Monaca, Pa.).***

The electrostatic fields, commonly called "static electricity," which are produced by masticating rubber and GR-S on a laboratory mill, have been measured with a new Electrostatic Field Strength Meter which records not only the strength of the field but also its polarity. This new device, which is described, is essentially our "Electrostatic Modulator" into which a standard reference voltage of the proper frequency and phase has been introduced to enable polarity, as well as field strength, to be measured.

The instrument shows that rubber starts out with a very highly negative electrostatic field which becomes less negative as mastication proceeds. The field in some cases goes to zero (0) value, and in others, reverses polarity and goes to a positive (+) value. This decrease in negative charge or an electronic rearrangement directly indicates an oxidation reaction. This supports the classic work of Busse and Cotton, who found that mastication is an oxidation process. By using this equipment as a processing control, it should be possible to improve on quality through better dispersion and also reduce costs through proper sequence and timing of operations.

Some correlation of Mooney plasticity with electrical contact potential and changes in electrostatic field strengths has been shown for rubber broken down on a laboratory mill. Data on GR-S do not show this great decrease in electrostatic field strength or contact potential as mastication proceeds. Electrostatic curves for GR-S polymerized at low temperatures as well as for cross-linked GR-S-60 are shown.

The importance of these electrostatic attractive and repulsive fields around rubber during milling is discussed also in relation to the possible effect on rate of incorporation and dispersion of pigments.

**3:15 P. M.—Nitrosomethane and Its Significance in Free Radical Reactions.** ***Thomas F. Doumani and Clarence S. Coe (Union Oil Co. of Calif., Los Angeles, Calif.).***

Chemical reactions which appear to involve free radicals or atoms have become increasingly important in processes of particular interest to the rubber, petroleum, and chemical industries. The use of small amounts of nitric oxide for the detection of chain reactions in gaseous mixtures has been studied by many investigators (Hinshelwood, et al). Speculation as to the mechanism of this inhibition has been extensive. Recently, the authors isolated nitrosomethane for the first time as its dimer by the photolysis of t-butylnitrite [*J. Am. Chem. Soc.*, Vol. 70, p. 1516 (1948)]:

$$(CH_3)_3CONO \rightarrow (CH_3)_2CO + CH_3NO$$

Since no ethane could be found it was believed that this formation of nitrosomethane occurred intramolecularly. It is not implied that the cission of the O-NO and the C-$CH_3$ bonds occur simultaneously, for it is the former bond which is broken first. However, the $(CH_3)_3CO$ radical is apparently sufficiently unstable to almost immediately liberate a $CH_3$ radical which combines with the NO before it is far removed (compare Waters, W.A., "Chemistry of Free Radicals" Oxford, 1948, p. 125).

To isolate nitrosomethane by the reaction of a $CH_3$ radical with NO it is necessary to employ relatively low temperatures, otherwise isomerization to formaldoxime occurs:

$$CH_3NO \rightarrow CH_2NOH$$

At 125° C. approximately 10 per cent conversion per minute is effected in the vapor phase. Even in the solid state at 32° C. dimeric nitrosomethane undergoes change as evidenced by the depression in its melting point with time. At sufficiently high temperatures the nitrosomethane simply has a transitory existence. This is undoubtedly the case for the vapor phase decomposition of di-t-butyl peroxide in the presence of nitric oxide [*J. Am. Chem. Soc.*, Vol. 70, p. 88 (1948)].

When NO is employed for the detection of free radicals at high temperatures, the effects of the possible oximes produced from the various free radicals should be considered. Thus, the transitory inhibition by NO for the thermal decomposition of n-butane might be attributed to the production of free radicals from the decomposition of the oximes (produced from the corresponding nitroso compounds), rather than the equilibrium reaction given [*J. Am. Chem. Soc.*, Vol. 61, p. 1024 (1939)].

**3:55 P. M.—Drying of Latex Rubber Deposits.** ***E. O. Partridge and M. E. Hansen (American Anode, Inc., Akron, Ohio; paper will be presented by R. A. Lees, American Anode, Inc., Los Angeles, Calif.).***

The drying of rubber articles made from either natural or synthetic latex rubber is one of the most important unit processes used in such manufacture. Articles are usually made by either straight dipping or coagulant dipping although other processes such as gelation or casting are also used to a limited extent. In all instances, the removal of water by drying is necessary.

The general principles of drying apply in all cases, but, because of the constant decrease of porosity which occurs during the drying procedure due to the shrinkage of the deposit, it becomes progressively more difficult to completely remove the moisture. Such factors as absolute humidity, relative humidity, temperature and circulation of the air affect the drying.

The problem of migration of the moisture from within the deposit in a progressively more solid rubber deposit is considered. By proper design and proper control of conditions, the rubber articles can be dried properly and economically but if these factors are not controlled many difficulties can arise which will lead to an inferior rubber product.

Illustrations are included which show the various changes occurring during the drying operations. Flowable films, such as those created by straight dipping, can become wetter after being put into a drying oven. Blisters can be formed between the deposit and the form, but the formation of such blisters can be controlled. All of these difficulties can be overcome by the proper design of ovens and the proper applications of fundamental drying principles.

**4:00 P. M.—Emulsion Polymerizations at Low Temperatures.** ***C. F. Fryling, C. A. Uraneck, W. M. St. John and S. H. Landes (Phillips Petroleum Co., Phillips, Tex.).***

The production of Philprenes A and B has aroused great interest. These are chemical rubbers copolymerized from butadiene and styrene at 41° F. and 14° F. Their outstanding characteristic is high performance when fabricated into tires. In addition, they exhibit superior tensile strength, abrasion, and tear resistance, coupled with easy processability.

This major achievement became possible only as the result of developing fast, low temperature emulsion polymerization recipes. Two types of recipes are described, those initiated by diazo thioethers and oxidation-reduction recipes catalyzed by iron pyrophosphate complexes.

These recipes were developed by subjecting various reagents to comparative polymerization tests and by a systematic study of the adjustment of reactants with the object of determining optimum concentrations. A reconsideration of all ingredients of emulsion polymerization recipes was required to obtain satisfactory operation at low temperatures. Soluble emulsifying agents were needed as were also freezing point depressants, which would not retard the reaction and which could be recovered cheaply. The concentration of modifier was lowered to avoid the production of excessively low molecular weight products. A very careful adjustment of initiator ingredients was made, which investigation led to the discovery of interesting stoichiometric relationships. Studies of the influence of temperature and electrolyte concentrations were required because of the many anomolous effects observed.

From this fundamental investigation has come a superior polybutadiene, chemical rubber tires which outwear those from natural rubber, and the demonstration by X-rays that low temperature rubber consists largely of butadiene units extended in a *trans* configuration.

**4:25 P. M.—The Effect of Diolefin Type and Concentration of the Properties of Butyl.** ***L. M. Welch, J. F. Nelson, and H. L. Wilson (Esso Laboratories, Standard Oil Development Co., Elizabeth, N. J.).***

Although Butyl polymers can be made by copolymerizing isobutylene with a variety of diolefins, isoprene is the diolefin used in the commercial production of Butyl rubber (GR-I).

The choice of isoprene was based on its availability, the polymer quality and its applicability in the process.

At the present time the major part of GR-I production goes into inner tubes, primarily because of its air holding properties and excellent tear resistance. However, there is a growing market for Butyl in other uses such as mechanical goods, wire insulation, curing bags, proofed goods, farm tractor tires, etc. Polymer variations, as well as compounding changes, are important in obtaining optimum properties for the above uses. This paper deals with the effect of the diolefin type and degree of unsaturation on the properties of Butyl polymers, with a minimum discussion of compounding variations.

A comparison is made of copolymers of isobutylene with isoprene, butadiene, dimethylbutadiene and piperylene. So far as the tensile - elongation - modulus properties are concerned, the piperylene polymers are inferior to the others. For all types the rate of cure increases rapidly with increased unsaturation as would be expected. It is shown that Butyl polymers which are cured to relatively high moduli suffer some loss in tensile and tear properties. However, the trend in the rubber industry is toward GR-I-15, a polymer of higher unsaturation than GR-I, because of the faster cure rate which results in a higher state of cure and better inner tube performance.

More extensive comparisons of Butyl containing isoprene and butadiene, which are of commercial interest, show that the latter is superior in steam-air aging at high temperature. This is of interest for the preparation of superior curing bags. The butadiene type polymers also show less tendency to overcure, maintain a higher tensile strength and tear resistance at high modulus levels, and have superior acid resistance. On the other hand, isoprene type polymers are superior in rebound, Goodrich flexometer and retraction rate at low temperature.

## *Friday Morning—July 23*

**9:00 A. M.—Effect of Some Accelerators on the Physical Properties of Nitrile Rubber Vulcanizates.** ***R. R. James, R. E. Morris and I. P. Seegman (Mare Island Naval Shipyard, Vallejo, Calif.).***

Thiazole acceleration has been commonly used in nitrile rubber stocks intended for widely different applications. The purpose of this investigation was to determine whether thiuram acceleration or a no-sulfur acceleration would give better properties than thiazole acceleration for applications which require minimum drift or minimum stress relaxation.

All stocks tested but one were identical except for the type and amount of accelerator and curing agent contained. The exception contained a coumarone indene resin instead of ester plasticizers. The accelerator-curing agent combinations studied were as follows: (1) thiazole disulfide with normal sulfur, (2) thiuram monosulfide with normal sulfur, (3) increased thiuram monosulfide with reduced sulfur, and (4) thiazole with thiuram disulfide and selenium.

The stocks were evaluated for strength, mechanical and rheological characteristics. The strength characteristics were the usual tensile properties and tear resistance. The mechanical characteristics were hardness, static and dynamic modulus, resilience and energy absorption. The rheological characteristics were compression set and stress relaxation at 194° F., and drift at 82° F. and 194° F.

Accelerator-curing agent combination (4) gave the best strength characteristics with combination (1) next best. Combination (3) gave the most desirable rheological properties, and gave what would usually be considered as the best mechanical properties, i. e., it yielded the highest resilience and least difference between the static and dynamic moduli. Combination (2) was next best in these respects.

The main effects of substituting coumarone-indene resin for the esters were an improvement in strength characteristics and a change in mechanical characteristics towards increased hardness and reduced resilience.

Evidence was obtained that an approximate correlation exists between compression set and stress relaxation and between compression set and drift, at least when the tests are performed at the same temperature and initial deflection. This enables the relative stress relaxation and drift of vulcanizates to be evaluated by means of the comparatively simple compression set test.

**9:25 A. M.—Variability of a Typical Commercial Oil Resistant Synthetic Rubber.** ***C. L. Smith and Laverne E. Cheyney (Battelle Memorial Institute, Columbus, Ohio).***

In connection with an experimental project on aircraft hydraulic packings, it was necessary to determine the variation in properties of the finished product which could be expected from variability within the original polymer. This study was accordingly undertaken to provide such information regarding Perbunan 18, a butadiene-acrylonitrile copolymer popularly employed for this application.

In order to "calibrate" the properties employed, it was necessary to determine the experimental or testing error within a given lot. This factor was determined by repeated testing, employing a series of compounded batches from the master lot. Lot-to-lot variability was determined on a series of lots selected at random from the manufacturer's inventory of this polymer.

A standard compounding recipe was employed for the entire study. Plasticity and extrusion index were determined on the unvulcanized material. Stress-strain properties, hardness, and swelling in hydrocarbon-base hydraulic fluid were measured on the vulcanized stocks. The data were analyzed statistically as outlined in the A.S.T.M. Manual on Presentation of Data.

Results indicate that the variation among lots with this particular polymer is no greater than the normal testing error within a given lot. Normal frequency distribution curves were obtained for plasticity, extrusion, hardness, elongation, and swelling, whereas tensile strength failed to conform to a normal distribution. Tensile stress at a lower elongation produced a more normal type of distribution curve than the corresponding stress at a higher elongation.

**9:45 A. M.—Practical Accelerator and Sulfur Ratios for H.A.F. Type Blacks in Natural and GR-S Rubbers.** ***G. E. Popp and L. Harbison (Phillips Petroleum Co., Bartlesville, Okla.).***

With the advent of established and consistent production of High Abrasion Furnace blacks, a modification in compounding technique presents itself due to the different effects on the rate of vulcanization as compared to channel type blacks. In view of the efficiency of the manufacturing process for H.A.F. blacks compared with the current economics of channel black manufacture, and also the merits of a High Abrasion Furnace black in compounding natural or synthetic rubber products, one becomes cognizant of the need of a practical approach toward the best use of these modern blacks.

Data are presented showing the effective vulcanization of N-cyclohexyl - 2 - benzothiazole sulfenamide, mercaptobenzothiazole and benzothiazyl disulfide accelerators in conjunction with sulfur ratios when comparing H.A.F. blacks with channel blacks in GR-S and natural rubbers. Typical recipes are shown exemplifying the differences in physical properties, processing characteristics and extrusion properties as obtained in the laboratory and the factory. It is further indicated that when H.A.F. blacks are used in natural rubber, different accelerators will give variance in abrasion characteristics and scorching tendencies.

**10:05 A. M.—Reclaimed Rubber Today versus Prewar.** ***Robert L. Randall (Midwest Rubber Reclaiming Co., East St. Louis, Ill.).***

A review is presented of the transition in reclaimed rubber from a straight natural rubber base to the processing of materials containing both natural rubber and GR-S.

Comparison is made between typical natural rubber prewar reclaims and present day reclaims based on mixtures of natural rubber and GR-S. These comparisons are carried through end product compounds in which reclaimed rubber has long played an important role. Physical data are shown for compounds typical of the following: (1) Passenger Tire Carcass, (2) Passenger Tire Undertread, (3) Automotive Mat, (4) Black Heel, and (5) Hard Rubber Storage Battery Container. Except for hard rubber, data are given both before and after oven aging.

Results indicate that replacement of the prewar types of reclaimed rubber with grades representative of present day manufacture can be made without sacrifice of quality and with the advantage of improved processing.

Development of new grades of reclaimed rubber is outlined which are expected to play an increasingly important role in providing new compounding materials for the rubber industry.

**10:35 A. M.—Some Aspects of Rubber-Rayon Adhesion. *H. H. Gillman and R. Thoman (Gates Rubber Co., Denver, Colo.).***

It is now well known that rayon fibers must be treated with an adhesive to obtain sufficient bond for use in tires and other rubber products. This paper describes some of the adhesion factors which need to be considered in product design.

Methods for measuring rubber to fiber adhesion have not yet been standardized, although satisfactory results have been obtained by both the strip and "H" tests. Statistically treated data collected on these two test methods show the strip test to have greater precision. The strip method is also to be preferred for its general simplicity.

Natural latex resorcinol-formaldehyde is compared to a reclaim dispersion casein dip using pure gum, zinc oxide, and reclaim carcass stocks. The dependence of bond strength on temperature is shown as well as the relation to physical properties of the carcass stocks. Graphs are presented showing effects of Geer oven aging.

A discussion is given on the requirements of a good bonding agent and of test fabrics, the over-all factors affecting bond strength, and on test methods and analysis of failures. Of particular importance is the analysis of failed specimens which show that separation ordinarily occurs at one of three points: (1) within the stock, (2) at the stock-adhesive interface, and (3) at the adhesive-fiber interface.

In giving an adequate definition of adhesion, the type of failure must be shown as the numerical value alone does not reveal the weakest component. Improvement in adhesion can only come by recognizing the weakest element in subsequent strengthening. The point of failure should be watched, in particular, when dealing with a progressive series of measurements as it may change within the series.

**10:55 A. M.—The Dynamic Characteristics of Neoprene Vulcanizates. *N. L. Catton, E. H. Krismann and W. N. Keen (Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.).***

Modern advancements in the application of elastomeric materials to engineering problems have indicated the need of more adequate information about the dynamic characteristics of their vulcanizates. The adaptability of certain synthetic elastomers to products requiring resistance to sunlight, heat, oil, etc., has been retarded by this lack of information. We refer to conditions of service where the limitations of natural rubber curtail its use.

This paper discusses some of the dynamic properties of neoprene vulcanizates. Data are presented on the effect of variations in loading on such properties as resilience, heat build-up, dynamic modulus, and dampening. We propose to show the differences that are revealed in these properties in neoprene and in natural rubber vulcanizates as the filler content is increased. Other variables, such as time and temperature of cure and test conditions, are discussed.

**11:40 A. M.—The Effect of Die Surface Irregularities upon Results of the Tensile Test for Vulcanized Rubber. *U. H. Klute (Shell Development Co., Emeryville, Calif.).***

Examination of the inner surfaces of two tensile test dies of recent manufacture revealed that the inside surfaces of the cutting edges were characteristically tool marked. Measurements of the tensile properties of a variety of vulcanized rubber stocks using these dies to prepare the specimens as well as a die with improved cutting surfaces indicate that surface imperfections (tool marks) on the former dies result in significant lowering of test values of tensile strength and ultimate elongation in most of the cases examined. In one instance the difference approached 10 per cent.

To supplement these results, replicas were made of the die-cut rubber surfaces using a casting resin and the replicas were examined with a Brush Surface Analyzer. The surface profiles so obtained showed that while the maximum irregularities were of the same order of magnitude for the three dies examined, the die with the improved cutting surfaces produced specimens whose surfaces were not marred with multitudes of small, sharp nicks as was the case with the specimens cut with the unimproved die surfaces.

## *Friday Afternoon—July 23*

**2:00 P. M.—S-Polymers for Food Packaging. *W. A. Fairclough (Enjay Co.) and R. G. Newberg and J. R. Briggs (Esso Laboratories, Elizabeth, N. J.).***

The S-Polymers, a new series of all-hydrocarbon thermoplastic resinous copolymers, possess many of the attributes desirable for a food packaging material. They process very satisfactorily on conventional types of rubber and plastics fabricating equipment to form either self-supported films or coatings on paper, cloth, glass fabrics, and even metal foils. Their outstanding characteristics in addition to their processability include excellent resistance to the penetration of moisture vapor and gases. These properties are coupled with good physicals such as tensile strength, elongation, colorless appearance, electricals, and light stability. The good moisture and gas resistance in conjunction with the other characteristics outlined makes these resins interesting as packaging mediums for fresh fruits and vegetables, dried foods and similar applications.

Experimental data are presented to show that the S-Polymers may be employed advantageously for the packaging of fresh and dried fruits. Packages made up of calendered S-50 Polymer film prolonged the storage life of the fruit, retaining a high percentage of the original weight with very little if any deleterious effects on the appearance, food value or edibility. Such tests were conducted over periods of several months duration.

Investigations are also reported revealing that some system of ventilation or some modification of the S-50 polymer is necessary in order to establish the proper balance between respiration and transpiration of the fresh fruit. This is dictated by the fact that the S-Polymers are so resistant to the penetration of gases and moisture that packages, if completely sealed, will not permit the normal life sustaining processes of fresh fruit to take place. Experiments are shown which indicate that mechanical ventilation of the packages if judiciously employed is quite adequate. Other investigations gave some indication that modification of the resin through compounding may serve the same purpose.

The studies reported in this paper indicate that S-Polymers may be used to advantage in a variety of packaging applications including fresh fruits, dried foods, dry chemicals, tobacco, frozen foods, etc.

**2:20 P. M.—Properties of Some Oil Resistant Adhesives. *F. Wehmer, G. F. Lindner and Dr. A. F. Schmelzle (Minnesota Mining & Mfg. Co., Saint Paul, Minn.).***

This paper will cover the reasons for work on oil resistant adhesives and will attempt to present the properties of oil resistant adhesives having been made from three different base materials—namely, neoprene, Buna N and Thiokol. We propose to present data indicating the relative strength and oil resistance of these materials when made into oil resistant adhesives. We hope also to make a comparison of the working properties of the three types of adhesives. We plan to spend a little time in explaining the test methods which we have used. We shall indicate where some of these adhesives have been found useful and we shall try to point out the need for further work on oil resistant adhesives.

**2:45 P. M.—Some of the Physical and Chemical Properties of Thiokol PR-1. *Walter E. Boswell (Thiokol Corp., Trenton, N. J.).***

Thiokol PR-1 is the latest of the polysulfide type of crude synthetic rubbers to be submitted to the rubber industry. It may be classified as a tailor-made polymer because its development was based on including as many desirable characteristics of the polysulfide type of rubbers as could be incorporated into this polymer. Laboratory research and commercial field uses of PR-1 show that many of these characteristics have been realized.

Vulcanized articles show good dimensional stability in both aromatic and non-aromatic fuels. This brings it in the classification of an oil resistant rubber. However, going a step further than merely being oil resistant, Thiokol PR-1 shows ex-

ceptionally low swell in the majority of commonly known and used solvents which are out of the range of classification of the ordinary oil and gasoline types. Figures on some of the volume swell characteristics of other synthetic rubbers in comparison with Thiokol PR-1 will be given.

Another characteristic of this material is its good low temperature flexibility without the aid of an extractable plasticizer. Some comparisons of this feature between Thiokol PR-1 and other synthetic rubbers will be made.

Thiokol PR-1 shows resistance to compression set over a wide range of temperatures and a comparison of this feature with some of the other synthetic rubbers will be made basing the evaluations of the other synthetic rubbers on data taken from the published literature.

In addition to the above mentioned characteristics Thiokol PR-1 exhibits the excellent aging characteristics of all of the previous types of Thiokol crude synthetics. Some basic information on compounding and factory processing together with physical data will be included.

**3:05 P. M.—Comparison of Cements for Bonding Nitrile Rubber to Steel.** ***J. W. Hollister, R. E. Morris and P. A. Mallard (Mare Island Naval Shipyard, Vallejo, Calif.).***

The relative effectiveness of chlorinated rubber and phenolic resin cements for bonding a nitrile rubber vulcanizate to steel has been determined from the standpoints of reliability, resistance to gasoline, resistance to boiling water and strength at temperatures up to 350° F. The bond strengths were determined in tension by the A.S.T.M. procedure.

It was found that a proprietary chlorinated rubber cement and the phenolic resin cement are equally reliable and are somewhat better in this respect than ordinary chlorinated rubber cement, that phenolic resin bonds withstand aromatic gasoline and elevated temperatures better than chlorinated rubber bonds, and that chlorinated rubber bonds withstand boiling water better than the phenolic resin bond.

**3:30 P. M.—Neoprene AC-Resin Cements.** ***Grover S. Ramsay and George I. Petelin (Goodyear Rubber Co., San Francisco, Calif.).***

One of the problems of the rubber manufacturer has been the development of a one application cement for the adhesion of cured rubber to metal and other surfaces. One cement developed for this purpose has been the combination of Neoprene AC and a resin dissolved in a suitable solvent. Thermoplastic terpene phenolic has been the resin most widely used. In an effort to find other resins to substitute for the terpene phenolic, a series of experiments were conducted using modified phenolics and a pure phenolic.

In tests of adhesions to metal (sheet tin), wood and cotton duck, and bond strength of rubber plys, the pure phenolic cement was found to be comparable or superior to the terpene phenolic cement. The rubber stocks tested were ordinary factory stocks of 40 to 60 Shore in hardness. Natural rubber, neoprene, GR-S, Thiokol PR-1, Buna N and Butyl stocks were tested.

The pure phenolic gave good adhesion to sheet tin, wood and duck. It gave excellent bond strength, 15 pounds stripping pull-between plys of neoprene and good bond strength, 10 to 12 pounds stripping pull, between plys of Buna-N, Butyl and Thiokol PR-1. The bond strength between plys of natural rubber and between plys of GR-S was poor and plying up of these rubbers using this type of cement is not a safe procedure.

The best composition of cement tested consisted of 50 parts of resin to 100 parts of neoprene. This was dissolved in enough solvent to give a smooth cement coat. All cements were prepared and all tests were performed with factory and field use of the cements as the major requirement to be fulfilled.

**3:50 P. M.—Ultra Accelerators in GR-S.** ***C. M. Wolf and C. C. de Hilster (Sharples Chemicals Inc., Wyandotte, Mich.).***

A literature survey fails to show a complete rubber compounding survey of an homologous series of the thiurams or metal dialkyldithiocarbamates as vulcanization accelerators. Therefore, the methyl, ethyl, *n*-propyl, *n*-butyl, and *n*-amyl derivatives of the tetraalkylthiuram mono- and disulfides, and the lead, zinc, selenium and copper salts of the metal dialkyldithiocarbamates were prepared for testing. The scope of this paper is limited to a study of these products on an equal weight basis in a typical GR-S stock reinforced with 50 parts of EPC black.

In general, the results show that an increase in the alkyl group decreases the activity of the accelerator. The slightly slower curing rate obtained with each methylene addition in the alkyl group is readily compensated, particularly in the lower members of the series, by slightly increasing the cure time without appreciable sacrifice in tensile strength, modulus, or elongation. The ethyl derivatives are safer processing, less scorchy, and afford greater freedom from bin cure, than the corresponding methyl compounds.

The various members in the homologous series when employed as secondaries may be interchanged with little effect on the physical properties of the vulcanizates.

The thiuram disulfides are more active accelerators than the monosulfides. The order of decreasing accelerator activity for the metal dialkyldithiocarbamates is copper, selenium, zinc, and lead. These generalities apply particularly to the ultras when used as primaries; however, the same trends, but to a lesser degree, are observed when they are employed as secondaries with mercaptobenzothiazole-type accelerators.

The selenium dialkyldithiocarbamates are faster curing vulcanizing agents than are the corresponding thiuram disulfides. As vulcanizing agents these two homologous series follow the same order of accelerator activity as observed for their use as primaries, but to a more marked degree. The higher members of the series particularly exhibit a pronounced decrease in rate of cure as vulcanizing agents.

**4:10 P. M.—Uses and Applications of Tuf-Lite, A New Plastic Material.** ***H. R. Thies (Goodyear Tire & Rubber Co., Akron, Ohio).***

During the past several years, the technology of plastics and the technology of rubber have been coming closer and closer together. Tuf-Lite is a union of both plastics and rubber. Its properties and uses are described and some predictions made as to what the future holds for this material.

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Taber Instrument Corp., North Tonawanda, N. Y., recently introduced the **Model 100-108 Vacuum Pickup Attachment,** an accessory designed for use with the Taber Abraser. It is a powerful two-stage turbine vacuum unit which continuously removes abradings from the wear-track produced on the test specimen by the abrading wheels. Its use is said to assure effective, uniform contact of wheel faces against the specimen on the abrader.

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**The Rosinger Magnetic Stirrer,** a product of Ivan Sorvall, 210 Fifth Ave., New York 10, N. Y., is a novel laboratory instrument of versatile application. The principle of operation is to cause a magnetic bar, covered with a protective coating, to rotate in a liquid contained in a vessel of non-magnetic material. The rotation of the magnetic bar (or rotor) stirs the liquid. This motion of the bar is effected by a rotating magnetic field, which is creaed by a permanent magnet, kept in motion by a motor. The stirrer finds valuable application in carrying out the usual laboratory titrations.

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Production of a new line of **AC solenoid-operated 4-way selector valves** has been announced by Savel, Inc., of Los Angeles, Calif. They are designed for service with water, oil or air at operating temperatures to 250 p.s.i., and may be converted for DC operation merely by changing solenoids.

## Report on the Rubber Industry in Argentina

TIRE manufacturers in Argentina, operating on a 24-hour day, 6-day week basis, produced an estimated 279,000 tires during the first quarter of 1948, according to a recent report by the U. S. Department of Commerce. This amount represented a gain of 6,500 tires from the estimated output of 272,500 tires in the final quarter of 1947. Figures on tube production are not available, but according to trade sources the output has been running somewhat greater than that of tires and has been meeting most of the domestic demands.

The backlog demand for most tire sizes has been considerably reduced. Large truck tires are still needed from abroad, and the Government has been urged to make an exception to tire import restrictions in favor of the large truck sizes until domestic production has caught up with demand.

The most significant development during 1947 was the readjustment of automobile tire manufacturers to improved rubber supply conditions and the resultant record production of more than 970,000 tires. This was an increase of more than 75 per cent from the 1946 production of 546,700 tires and nearly 10 times the output of 98,100 tires in 1945.

Many factories producing rubber manufactures other than tires and tubes resumed operations in 1947 and increased their output substantially in the first quarter of 1948. Others reopened during the first few months of this year, and several new firms have begun to produce rubber items. By the end of March, Argentine production was meeting demand in some lines, and ample supplies of almost all rubber items seemed assured before the end of 1948.

Argentina imported 38,641 metric tons of natural rubber during the first 11 months of 1947, according to the latest statement of the Director General of Statistics and Census. Although later figures are not available, it is believed that importation has been continued at a similar rate, and that current reserves are more than adequate for full-scale operation of tire and other rubber product factories for two years.

The Government's National Corporation for Production of Vegetable Rubber is pushing development of its 27,000-acre guayule rubber project. The first year of extraction will be 1950, and the yield, it is hoped, will be 3,000 tons, or about 25 per cent of annual consumption requirements.

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## Norway's Rubber Industry and Trade in 1947

DOMESTIC production of rubber goods in Norway during 1947 is reported to have been greater than it was in prewar years, according to the U. S. Department of Commerce. Supplies of rubber and chemicals were sufficient, although somewhat tight in the latter part of the year, as a result of the general reduction of imports. Crude rubber and gutta-percha came mainly from British Malaya. Imports totaled 3,365 metric tons, valued at 7,400,000 crowns. (1 crown was equivalent to $0.2016 in 1947 and $0.2018 in 1946.)

Total imports of all kinds of rubber goods, except footwear, in 1947 amounted to approximately 30,000,000 crowns, compared with 19,000,000 in 1946. The great rise in imports in 1947 was mainly a result of the shipment in 1947 of some goods ordered in 1946. Chief suppliers were the United Kingdom and the United States. These two countries delivered about 60 per cent of the total import volume of rubber goods.

The import program for 1948, set up by the Ministry of Supply, calls for imports of rubber and rubber goods valued at 20,000,000 crowns, or about two-thirds of the 1947 imports. It is estimated that restrictions will fall most heavily on manufactured rubber goods, rather than on semi-processed goods for the domestic industry.

The result of reduced supplies is already apparent. Tires for private automobiles have been rationed, although restrictions have not yet been imposed on tires for trucks. Rubber footwear has been rationed ever since the war.

Importers of rubber goods have estimated 1948 import requirements for tires at 7,000,000 crowns and for other rubber goods at about 1,500,000 crowns. Norway's import budget provides for imports valued at 3,000,000 crowns for tires and 500,000 crowns for other rubber goods.

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## Full-Size Portable Swimming Pool

IT IS rather impractical to dig up a full-size swimming pool every week for sixty weeks and move it to another city. But that was the problem facing Buster Crabbe, Hollywood swimming star and manager of the swim show "Aqua Parade of 1948." That is, it was a problem until the rubberized fabric experts of the Goodyear Tire & Rubber Co. were consulted.

"Aqua Parade" needed two tanks in which selected bathing beauties and famous divers could present a modern, water-borne stage show. Relying on their wartime experiences in building training pools for the U. S. Navy, Goodyear engineers designed a 98,000 gallon swim tank and a 25,000 gallon diving tank that could be erected in three hours and taken down in something less than that.

For the swimming tank a water-retaining, synthetic rubber-coated, nylon liner 54 feet by 84 feet was built. When placed within special metal retaining walls, this huge liner forms a rectangular pool 42 feet wide by 72 long and four feet deep. For the circular diving tank a special nylon liner was tailored to fit within a metal retaining form 25 feet in diameter and eight feet deep.

The two portable pools are the first ever to be built of nylon, a weight saving factor that is valuable to the traveling water show. The rectangular pool, for instance, weighs 1,400 pounds packaged, but it holds approximately 784,000 pounds of water, when erected.

Crabbe and his troupe of 75 people have been training on the west coast for months. They will show in 60 U. S. cities as well as two out of the country.

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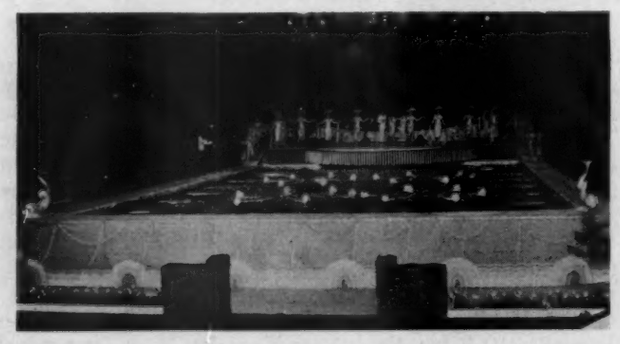

*This portable swimming pool designed by Goodyear fabric experts can be erected in less than three hours.*

*Use*

# STATEX B

## IN HEAVY DUTY TIRES

TO DEVELOP MAXIMUM CARCASS LIFE

TURN THE PAGE FOR EXPLANATION

A COLUMBIAN COLLOID

COLUMBIAN CARBON COMPANY

500 TONS OF SMOKE A DAY

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# STATEX-B

not only produces treads which run cooler, flex and age better and afford maximum protection for recapping, but STATEX-B is also best in inside stocks.

In loadings such as are employed in skin coat stocks, STATEX-B produces higher tensiles than other carbons and outstanding tear resistance.

■

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# Editorials . . . . . .

## Low Temperature Rubbers

WIDESPREAD publicity is being given to the new so-called low temperature synthetic rubbers. Unfortunately, as so often happens in these cases, some of the statements being made are somewhat on the extravagant side. Whereas the rubber technologist can draw a firm line between claims and performance, the layman too often accepts the claims as gospel and expects too much from the new material.

There is no question that the low temperature rubbers represent the major achievement thus far in GR-S polymers. Laboratory tests alone are proof positive that tire treads made of these rubbers will outlast natural rubber treads, possibly by as much as 30%, and that in addition to superior abrasive qualities they exhibit other characteristics to match or surpass all other types of GR-S as well as the natural product. However, the point must be stressed that for the most part claims made to date are based solely on these laboratory tests, and specific road test results are yet to be revealed.

At the present stage of development the low temperature rubbers are marked by extreme toughness, which means longer milling time and heavier power requirements. It will be recalled that the advent of initial GR-S presented the same difficulties. In the same manner that early GR-S was improved to the point where it handled as easily as natural rubber we can expect low temperature rubbers to reach the same point. Until such time, however, the claims should be modified. Incidentally, a GR-S is now being experimentally made at the unprecedented low temperature of 0°F., according to an announcement made by the U. S. Rubber Co. just as this issue went to press.

## Labor Problem

AN indication of the difficulties confronting the small tire manufacturer as the competitive picture comes into clearer focus is found in the current deadlock between the management of the Pharis Tire & Rubber Co. and the local union. In a sense it is also a forewarning of the position many small rubber manufacturers may find themselves in within the next year or two.

The Pharis plant at Newark, Ohio, has been closed since May 1, and according to executives of the company will remain closed for an indefinite period. According to Pharis officials, the company has lost substantial sums of money operating under its present contract with the union. As an alternative to closing the plant, the company offered the union a new contract with reductions in all but two of its 54 departments, the cuts ranging from 10 to 35 percent. The proposed average wage rate would be $1.62 an hour against the present $1.74 average.

The union, alleging that the company's profit is up 57 percent from the prewar level, is reported to have voted down the company proposition on three separate occasions. As union officials point out, acceptance of the proposition would mean losing gains achieved over a long period of years. Pharis claims it "costs us more money to make tires than we can get for them." The union is adamant in its stand to retain present wage levels. There must be a middle road, but it may take a Solomon to find it.

## Mechanical Goods

NEXT to tires and tubes the mechanical goods branch of the rubber industry consumes more rubber per year than any other branch. That this situation will continue for many years is indicated in a recent survey of the field taken by the *Wall Street Journal*. According to the survey, the mechanical rubber goods business has practically doubled in volume since prewar days. One company—Hewitt Rubber — reported that its production of mechanical goods is 10 times greater than it was in 1941.

The most encouraging angle of the expansion of mechanical rubber goods is the fact that many current developments lend themselves to large volume as, if and when finally adopted as standard equipment. Firestone's pneumatic rubber spring for railroad cars, for example, has tremendous possibilities. Goodrich's Torsilastic springs for passenger cars, trucks and buses also fall into this category. Improvements in these products—and hundreds of others—are being constantly made and steadily, if slowly, coming into commercial use. Continued growth of the mechanical goods field is assured by such developments.

# CURRENT NEWS OF THE MONTH

## COMMITTEE D-11 ON RUBBER HOLDS MEETING IN DETROIT

The Annual Meeting of Committee D-11 on Rubber and Rubber-Like Materials of the American Society for Testing Materials was held at the Book-Cadillac Hotel in Detroit, Mich., on June 25. Subcommittee meetings were held on June 23, 24 and 25, all at the Hotel Statler. The Rubber Committee's meetings were held in conjunction with the Fifty-First Annual Meeting of the parent society, which was held from June 21 to 25.

With more than 135 technical papers and reports of numerous committees, 360 committee meetings, and an extensive exhibit of research and testing apparatus and laboratory equipment, the meeting in general again emphasized the importance of work in materials. Total registration for the week totaled approximately 1775.

General features included a round-table discussion on ultra-sonic testing, a symposium on magnetic testing, delivery of the Marburg Lecture by Dr. P. C. Aebersold, of the Atomic Energy Commission, on "Isotopes and Their Application in the Field of Industrial Materials," and the presentation of various medals and awards. Richard L. Templin, of the Aluminum Co. of America, was elected president of the Society for 1948-49.

### *Committee D-11 Officers*

At the Annual Meeting of Committee D-11, Simon Collier (Johns-Manville) was re-elected as chairman, and A. W. Carpenter (Goodrich) as secretary. Harry G. Bimmerman (DuPont) was elected to the post of vice-chairman. The new Executive Committee consists of these three officers, plus the following: L. V. Cooper (Firestone), Harry Outcault (St. Joseph Lead), R. F. Tener (Bureau of Standards), and R. A. Schatzel (Rome Cable).

This year, for the first time, Committee D-11 held a special luncheon. The luncheon was turned into a tribute to Mr. Carpenter, who has served as committee secretary for many years, and who recently was married. A special gift, consisting of silver dollars, was presented to the new Mrs. Carpenter, who was present by invitation. The presentation was made by Mr. Cooper.

The luncheon proved so popular that it was decided to repeat it at future meetings of the group. The following were named to the committee to handle details of the next luncheon, which will probably be held in Atlantic City next year: R. M. Howlett (Enjay), G. C. Maassen (Vanderbilt), T. A. Bulifant (Barrett), and J. Breckley (Titanium Pigment).

### *Paper on Gas Masks*

One of the features of the meeting of Committee D-11 was the presentation of a paper on "Non-toxic Rubber for Gas Masks" by S. H. Katz of the Chemical Corps Technical Command, Army Chemical Center, Maryland. Mr. Katz said that some accelerators, antioxidants and vulcanizing agents for natural rubber caused physiological reactions on the skin of wearers of gas masks, and limiting the chemical ingredients in the rubber to those proved by tests to cause no physiological effects and to exclude others was necessary.

The patch tests employed in accordance with Chemical Corps specifications for acceptance of rubber parts of gas masks, which contact a wearer's skin, were outlined by the speaker. Twenty-five accelerators and nineteen antioxidants which proved innocuous in the proportions needed, usually about 1 to 2 parts per 100 parts of rubber by weight, were listed and discussed. Mr. Katz said that these materials would probably be innocuous if compounded with synthetic rubbers, but this has not been proved in the limited experience with synthetic rubber gas masks.

In his summation, Mr. Katz stressed the point that the accelerators and antioxidants discussed should not be accepted as suitable in articles contacting a wearer's skin for extensive periods, other than gas masks, without first undergoing patch tests and other tests appropriate for the purposes.

During the general meeting of the Society it was announced that the 1949 Annual Meeting will be held in Atlantic City during the week of June 27-July 1, and that the 1949 Committee Week and Spring Meeting will be held in Chicago during the week of February 27-March 4.

### Data on Mechanicals

Next to tires and tubes, mechanical goods, principally hose and belting, represent the biggest slice of the rubber business. According to an estimate made by one company in a recent survey conducted by the *Wall Street Journal*, hose and belting during 1948, not including V-belts, will ring up an industrial sales total of some $190,000,000, which is approximately $5,000,000 more than in 1947 and approximately $83,000,000 over 1941. Conveyor belting in particular is in tremendous demand.

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The development of Condor Homo-Flex Heavy Duty Air Hose for rugged service encountered in mining and quarry operations has been announced by Manhattan Rubber. It can also be used to advantage in other air service requiring a super-tough type of hose.

## URW AND RUBBER INDUSTRY AGREE ON 11-CENT HOURLY WAGE BOOST

Following the pattern established by the Firestone Tire & Rubber Co. which concluded an agreement with the United Rubber, Cork, Linoleum and Plastic Workers, CIO, on June 12 providing for an eleven-cent an hour wage rise, as reported in the June issue of RUBBER AGE, other members of the "big four" have come to similar terms with the union. Goodyear Tire & Rubber Co. signed its agreement on June 17, while B. F. Goodrich Co. signed with the union on June 27 although a strike had been threatened, and U. S. Rubber Co. signed on June 28.

At this writing, other, and smaller companies including the Sun Rubber Co., and the Ohio Rubber Co., had come to terms with the union, all for an eleven-cent an hour wage rise. The contracts signed ranged from one to two years, and included provisions for three-week vacations for employees of fifteen years standing. The contracts did not, however, include an escalator clause with a cost of living formula as does the General Motors contract signed earlier.

The contracts also permitted reopening of the wage question upon 60 days notice after a specified date, normally one year after the signing of the contract. The contracts also embody provisions for voluntary check-off of membership dues, grievance procedure and arbitration, overtime pay, severance pay and other matters generally covered by collective bargaining agreements.

During the past few weeks, the Pyramid Rubber Co., Ravenna, Ohio, the Polson Rubber Co., Garrettsville, Ohio, and the Oak Rubber Co., Ravenna, Ohio, entered the ranks of the URW for the first time, when their employees voted for a union shop. Wage agreements signed with the union approached the levels set by the larger companies.

### Labor Violence in France

Some 400 strikers and policemen were hurt on June 16 during continuous rioting around the Bergougnan Rubber Works at Clermont-Ferrand, France. The rioting was attributed to a sit-down strike against the company originally called by the General Federation of Labor, which followed demands for a 20% wage increase. The wage demand was made after the Government had failed to reduce living costs 10% by June 1 as promised. According to reports, the sit-down strikers damaged some $185,000 worth of machinery and equipment within the Bergougnan plant. Sympathy walkouts closed virtually all industries in Clermont-Ferrand, including the Michelin tire plant. Although labor conditions in the area are quiet at this writing, further difficulties are expected.

## GENERAL ELECTRIC COMPLETES SILICONE PLANT AT WATERFORD

A new multi-million dollar chemical plant for the manufacture of silicone materials has been completed at Waterford, N. Y., by the Chemical Department of the General Electric Co., it was announced on June 28 by Harry K. Collins, manager of the company's Resin and Insulation Materials Division.

In partial operation for about a year, the new plant is now ready to produce the war-developed materials at full capacity to meet an ever-increasing demand by industry for the various types of silicone products made here, Mr. Collins said. These products are processed in the form of rubber, oils, greases, resins and water-repellents.

Consisting of six buildings and a chemical tank farm located on a 15-acre plot, the Waterford plant currently employs approximately 150 persons. This number may increase slightly when full production is attained, the company said.

Mr. Collins disclosed that the demand for the silicone materials has come from practically all industries interested in heat-resistant materials and predicted that applications for the materials in all forms would become increasingly widespread.

### *Withstand Wide Temperature Range*

Derived from sand and processed by a completely new form of chemistry, silicone materials are noted for their ability to withstand a wide range of temperatures from approximately 70° F below zero to 520° above, a feature which makes them particularly applicable for various types of equipment used by the Armed Services in all temperature zones. Today the materials are being applied in as widely diversified products as diesel engines and fishermen's dri-flies.

Mr. Collins revealed that the major output of General Electric's silicones today is in the form of rubber, oils and G. E.'s famous bouncing putty, which has found extensive use as the center of the United States Rubber Company's golf balls. The silicone rubber is being applied primarily as gaskets for a host of industrial products such as capacitors, jet and gas turbine engines, baking ovens, lighting fixtures, and high vacuum systems. One of the principal uses for the oils is as a mold release agent in the manufacture of automobile tires and also in aluminum and zinc die-casting.

In connection with the announcement of completion of the Waterford plant, the availability of several new silicone materials was also announced. These included a new material which reduces water absorption in concrete and cement products and forms an invisible water-repellent coating on walls, floors and similar surfaces, and a silicone oil for use as a mold release agent in the injection molding of aluminum and zinc die-castings.

Major developments achieved by the G. E. Chemical Department in the silicone rubber field during the past year included a silicone rubber-coated glass cloth which will withstand operating temperatures as high as 520° F. and an adhesive for bonding silicone rubber to itself, metals and ceramics.

### Two New Flexol Plasticizers

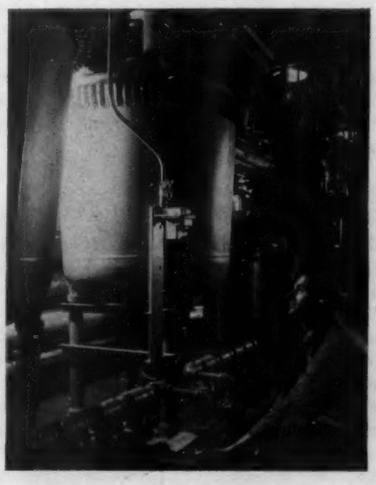
Two additional plasticizers have been added to the "Flexol" line featured by the Carbide and Carbon Chemicals Corp., New York City. They are Flexol Plasticizer TWS and Flexol Plasticizer R-1. Plasticizer TWS is a general purpose plasticizer featuring extremely low volatility with no loss during hot processing, high resiliency in vinyl films, flexibility at low temperatures, and good heat stability. Plasticizer R-1 is the first polymeric plasticizer offered by the company. It is non-migrating and is thus indicated for use where migration is a disadvantage. Because of its liquid nature, it is easy to handle and is readily incorporated in products. Both new plasticizers are compatible with VYNW, AYAF, Geon Resin 101, nitrocellulose, ethyl cellulose, etc. Both are incompatible with cellulose acetate.

### Alkiron Blue Iron Pigment

Production in commercial quantities of a new iron blue pigment called Alkiron Blue, which possesses resistance to alkalies, has been announced by Ansbacher-Siegle Corp., Rosebank, Staten Island, N. Y. Described as being superior to the usual iron blues in jetness of masstone, durability and resistance to attack by chemical agencies, the color is designed to appeal particularly to the paint, enamel and lacquer industry.

### Plastolein 9715 Plasticizer

Emery Industries, Inc., Cincinnati, Ohio, has introduced Plastolein 9715, described as a resinous plasticizer especially suitable for vinyls, where low volatability and low oil extraction is of major importance. The product, now available in commercial quantities, also has been found to be especially effective in polyvinyl acetate formulations. Emery has added new operating units to its plasticizer plant to handle increased production.



*Reaction Kettles at Waterford Plant*

*Aerial View of the New General Electric Plant at Waterford, N. Y.*

## EXCISE ON PERAMBULATOR TIRES CITED IN RMA PLEA TO CONGRESS

The tax on tires for strollers and perambulators actually runs more than 100% higher than the tax on such choice luxury items as mink coats, jewelry and costly perfumes, the House Ways and Means Committee was told recently, according to the Rubber Manufacturers Association. A plea for relief was embodied in a brief filed on June 8 with Chairman Harold Knutson by the Association on behalf of the makers of semi-pneumatic tires, molded solid tires and extruded, wired-on cab type tiring.

The present appeal for relief came as a supplement to a brief which the Association had filed in 1947 which cited the high wartime excise tax on automotive tires which was held by manufacturers to be excessively and disproportionately higher than the level against other automobile accessories. At certain levels of sale, automotive tires carry excise taxes running as high as 14 per cent. In its supplemental brief, the Association showed that the tax ranges from 49.3 to 55.7 per cent on baby carriage types of tiring, while taxes on certain semi-pneumatic toy and lawn mower tires were shown to range from 26.3 to 35 per cent.

The petitioners expressed the belief that Congress did not intend to subject these tires to taxation when it made automotive pneumatic tires taxable under the Revenue Act of 1932. According to the Association ,many of the tires in the semi-pneumatic class were not even manufactured at that time. As essential parts of industrial tools, of toys, and of such necessary vehicles as baby carriages and strollers, they are in no sense a luxury, the Association stated in its brief.

### Pharis Tire Remains Closed

The Pharis Tire & Rubber Co., Newark, Ohio, which has been shut down since May 1, will remain closed indefinitely, its president, Furber Marshall, said recently. Mr. Marshall stated that the plant, which employs 1300 persons, cannot compete with the sort of labor contract it had. The management has been trying since before May 1 to induce the United Rubber Workers to accept a new average wage rate of $1.62 an hour, compared with the former $1.74 average. The employees have been working thirty hours a week. In Akron, H. R. Lloyd, vice-president of the union, declared that members of the Newark local had turned the company's proposal down three times. The company's offer, he said, would have meant a plant-wide wage cut amounting to about 10 per cent.

### General Tire Leases Plant

The General Tire & Rubber Co. has acquired the equipment and leased the plant and engineering offices of the Phillips Aviation Co., 1525 Monterey Road, Los Angeles, Calif. When in full production, the plant and offices will employ approximately 250 persons.

## Coming Events

**July 22-23.** Rubber Division, A.C.S. Summer Meeting, Hotel Mayfair, Los Angeles, Calif.
**July 24-25.** Los Angeles Rubber Group. Outing, Catalina Island, Calif.
**July 31.** Buffalo Rubber Group, Outing, Lancaster Country Club, Buffalo, N. Y.
**Aug. 14.** Connecticut Rubber Group, Outing, Scallins Grove, Long Hill, Conn.
**Aug. 24.** New York Rubber Group. Golf Tournament, Winged Foot Golf Club, Mamaroneck, N. Y.
**Sept. 10.** Detroit Rubber & Plastics Group, Detroit-Leland Hotel, Detroit, Mich. (Tentative).
**Sept. 17.** Southern Ohio Rubber Group. Dayton, Ohio. (Tentative).
**Sept. 21.** Buffalo Rubber Group, Westbrook Hotel, Buffalo, N. Y.
**Sept. 24.** Boston Rubber Group, Somerset Hotel, Boston.
**Sept. 30.** Northern California Rubber Group.
**Oct. 1.** Detroit Rubber Group. (Tentative).
**Oct. 5.** Los Angeles Rubber Group, Mayfair Hotel, Los Angeles, Cal.
**Oct. 15.** New York Rubber Group, New York, N. Y.
**Oct. 19.** Buffalo Rubber Group, Westbrook Hotel, Buffalo, N. Y.
**Oct 28.** Northern California Rubber Group.
**Nov. 8-10.** Rubber Division, A.C.S., Fall Meeting, Book-Cadillac Hotel, Detroit, Mich.
**Nov. 18.** R. I. Rubber Club, Crown Hotel, Providence, R. I.
**Nov. 18.** Northern California Rubber Group.
**Dec. 7.** Los Angeles Rubber Group. Xmas Party.
**Dec. 9.** Southern Ohio Rubber Group, Xmas Party, Miami Valley Country Club, Dayton, Ohio.
**Dec. 10.** New York Rubber Group, Xmas Party, New York, N. Y.
**Dec. 10.** Detroit Rubber & Plastics Group, Xmas Party, Detroit-Leland Hotel, Detroit, Mich.
**Dec. 14.** Buffalo Rubber Group, Xmas Party, Westbrook Hotel, Buffalo, N. Y.
**Dec. 17.** Boston Rubber Group, Somerset Hotel, Boston.

### Siam Plans Rubber Program

Modernization of the rubber industry, and supervision of factories to obtain better output, are reported to be part of the Siamese Government's program for industrial revitalization. The Government has appointed a committee to confer with representatives of the Allied powers disposing of enemy property in order to fix the price of shares held by the Japanese in the Thai Minerals & Rubber Co. Half the shares are owned by the Siamese Government, and it is planned to purchase the other half formerly owned by the Japanese. At present the factory is manufacturing processed rubber articles, rubber shoes and soles, and products used by the State railways. Should funds become available, the Government plans to manufacture passenger car and bicycle tires for domestic use.

## SHIPMENTS OF CASINGS IN APRIL SHOW 28% INCREASE OVER MARCH

Shipments of passenger car casings during the month of April totalled 5,851,626 units, an increase of 28.46 per cent over March, when 4,555,303 units were shipped, according to the Rubber Manufacturers Association. Shipments of truck and bus casings for April were 1,186,940 units, an increase of 3½ per cent over March when 1,147,352 units were shipped. The trend in automotive tube shipments was similar with 5,806,542 tubes shipped in April, compared with 5,187,974 units the previous month.

A total of 5,372,651 passenger casings were produced in April, which compares with 5,665,656 units produced in March. Truck and bus casings produced in April were 1,201,083 units, while in March 1,264,297 casings were produced. In April, a total of 5,578,459 passenger and truck and bus tubes were produced, which compares with 5,534,053 units produced during March.

Inventories of passenger casings on April 30 totalled 8,858,055 units. On March 31, inventories of passenger casings totalled 9,304,281 units. Inventories of truck and bus casings as of April 30 totalled 2,082,228 units, while inventories of truck and bus casings on March 31 totalled 2,059,378 units. On April 30, inventories of passenger and truck and bus tubes were 9,737,206 units which compares with the 9,930,012 passenger and truck and bus tubes inventoried on March 31.

### Tire Prices Again Increased

An additional increase in the prices of tires and tubes was announced by the U. S. Rubber Co. on July 1. Passenger tires were increased by approximately 6% and truck tires by 5%. Farm tractor tire prices were increased from 6 to 7½%, depending on size, while prices of inner tubes were increased by 6%. Immediately following U. S. Rubber's announcement, in which the increases were attributed to rising costs of labor, raw materials, transportation and other factors, increases ranging from 4½% to 6% were announced by Dayton Rubber. Increases similar to that of U. S. Rubber were announced by Goodrich and Goodyear on July 6, while General Tire raised its prices from 5 to 7½%. Increases were subsequently announced by some of the smaller tire companies, including Seiberling and Mohawk. At this writing no announcement has been made by Firestone.

### Cathcart Named DuPont Advisor

Ernest R. Cathcart, formerly manager of the DuPont coated fabrics plant at Fairfield, Conn., has been appointed staff advisor to the company's fabrics division management, J. R. Buckley, division manager announced recently. Harry J. Jenemann, formerly assistant manager of the company's Newburgh, N. Y., plant, has been appointed manager at Fairfield, succeeding Mr. Cathcart. Charles C. Quenelle was named assistant plant manager at Newburgh to succeed Mr. Jenemann.

## MAY RUBBER CONSUMPTION UP 3% OVER APRIL WITH 87,826 TONS

A preliminary estimate of May rubber consumption, recently released by the Rubber Manufacturers Association, showed total rubber consumption of 87,826 tons, compared with 85,281 tons in April, an increase of aproximately 3 per cent total. Natural rubber consumed was estimated at 52,424 tons, up 3½ per cent over the previous month when 50,561 tons were consumed, and up almost 22 per cent over May, 1947, when 43,018 tons were consumed.

Total synthetic rubber consumption for May was estimated at 35,402 tons, up 2.23 per cent from April of this year when 34,630 tons were consumed, and down 27.30 per cent from May of 1947, when the consumption of synthetic was 48,692 tons. The estimate showed consumption of reclaimed rubber at 22,677 tons, approximately 3 per cent above April, when 22,023 tons were consumed.

Preliminary estimates of consumption by the Rubber Manufacturers Association will replace the monthly releases previously issued approximately 45 days after the end of the month reviewed. The estimates are based upon a substantial number of companies who report monthly to the Association. The experience of the first four months of 1948 indicates that the figures will closely approximate the actual tonnage reports which have previously been issued at a much later date.

### Offer New Shell Fillers

Compounding and filler flours made from hard, black walnut shells and pecan shells are now being marketed by the Harwick Standard Chemical Co., Akron. These flours are graded from a 325-mesh fineness up to a 10-16-mesh, the coarser grades being particularly suited to air-blast abrasive purposes. Flours of this type find use as fillers for plastics and in rubber compounding where light colored filler body is needed without too great an impairment of resilience. Shell processing is carried on under precision conditioning controls in a specially equipped plant in the Missouri-Oklahoma area from which the black walnut and hard shell pecans are harvested. Warehouse stocks of the new shell flours will be maintained at five central points throughout the country.

### Dayton Rubber Co.

Six Months Ended April 30: Net profit of $249,798, which is equal to 45 cents each on 453,341 common shares, on net sales of $13,211,248. This compares with a net profit of $1,094,906, or $2.31 each on 453,341 common shares, on net sales of $18,332,757 for the similar period last year. In connection with the report, A. L. Freedlander, president of the company, stated that for some time the company had been engaged in a planned diversification program, and several new mechanical rubber products and processes will be announced soon.

### Firestone Tire & Rubber Co.

Six Months Ended April 30: Net profit of $12,129,390, after taxes and all charges, which is equal to $6.04 each on 1,950,834 common shares, and compares with a net profit of $14,168,206, or $7.07 each on 1,950,834 common shares, for the similar period last year. The semi-annual report states that due to shortages of dollar exchange in some countries and the need for additional capital to finance increased volume of foreign subsidiaries, dividends received during the six months ended April 30, 1948, were $3,085,306 less than the total profit of foreign subsidiaries included in earnings.

### Webber Takes Over Representation

The corporation of Webber and Smith, Inc., which represented Thompson-Weinman & Co., and the Chemical Products Corp. in the New York Metropolitan area, has been dissolved, and hereafter the business will be conducted by Robert I. Webber under the name of the Robert I. Webber Co., 52 Vanderbilt Ave., New York 17, N. Y. The new company will represent the Evans Lead Corp., in addition to Thompson-Weinman and Chemical Products.

### Gillen Retires From Goodyear

Henry Thomas "Hank" Gillen, consulting superintendent of the Goodyear Tire & Rubber Co., retired recently after 47 years of service with the company. Mr. Gillen was born in 1880, and spent his boyhood in East Akron, Ohio, where he attended school. He followed this with two years at Actual Business College and three years in business. He then entered the B. F. Goodrich Co. where he worked in the shipping department. Mr. Gillen was then transferred to Kelly-Springfield Co., then known as the Buckeye Rubber Co. In 1901 he went to Goodyear, spending the first twelve years there in the shipping department and the traffic bureau. He was successively promoted to general foreman in the solid tires division, division superintendent of production, and production superintendent. In March, 1939, he was made consulting engineer and in 1940 consulting superintendent.

A line of plastic shielded modern fluorescent fixtures, especially designed to light and decorate every room in the house, has been made available by the Markstone Manufacturing Co. of Chicago. The plastic shields are made by U. S. Rubber.

## REINFORCING THE CARCASS OF HEWITT RUBBER'S ROTARY DRILLING HOSE

Three layers of high-tensile braided bead wire reinforce the carcass of Hewitt Monarch Rotary Drilling Hose made by Hewitt Rubber Division, Hewitt-Robins Inc., of Buffalo, N. Y. Because of it, Monarch rotary drilling hose is able to withstand the extremely high pressures encountered in deep-hole oil well drilling. It's built to resist the abrasive action of drilling muds, too. Its tube is made of a special-purpose synthetic rubber that is built to resist oil. Leakproof, built-in couplings developed by Hewitt are securely anchored to the duck and wire wall reinforcement, providing a continuous, smooth, unrestricted fluidway throughout the entire hose length. Monarch's tough strip proof cover is highly resistant to abrasion weathering and sun-checking.

## POST-WAR TECHNICAL JOURNAL REVIEWS GERMAN RUBBER INDUSTRY

Copies of the first post-war rubber Journal to be published in Germany have recently been received in this country. Called *Kautschuk und Gummi*, the technical paper represents a union of two earlier papers published in pre-war Germany, *Kautschuk* and *Gummi-Zeitung*. A portion of the first issue, January, 1948, has been devoted to a review of the German rubber industry as it was before the war, during the war, and the situation as it exists in the different occupation areas.

The magazine states that after 1933 rubber manufacturing generally expanded, while exports decreased. The Government's stockpiling program in 1937 contributed to this general trend. At the beginning of the war, natural rubber stocks amounted to 14,478 tons, an amount that was lower than many had supposed. Stocks in 1940 were 5,823 tons; in 1941, 14,164 tons; in 1942, 14,576 tons; in 1943, 15,276 tons.

Consumption of rubber before the war was put at roughly 80,000 tons annually and this figure included 7,000 tons of reclaim. During the years 1935 to 1944 a high of 99,918 tons of crude rubber were imported in 1938, while in 1944 only 5,000 tons were imported. The same period saw a high of 132,000 tons of buna produced in 1944. In 1936 only 678 tons of buna were produced. During the same period, the reclaim industry expanded, producing approximately 40,000 tons annually at its peak.

### *Conditions Under Occupation*

The German journal states that according to the new industry plan for Bizonia which was set up in August, 1947, rubber production was set at the level which existed in 1936, the last normal year of peacetime production. Approximately 65,000 tons of rubber were consumed during this period by the industry, exclusive of the cable and wire branches, toys and a few other minor lines. Of this sum 40,000 tons went into tires, 4,900 tons into belting and hose, 2,800 tons into heels and soles, 5,700 into soft rubber goods, 1,800 into footwear, 2,950 into fabrics, 1,100 tons into thread, 2,100 into hard rubber goods, and approximately 3,200 tons into other rubber goods and articles.

The 1936 level of production could be reached in Bizonia provided general economic developments are favorable. According to the publication, this is hardly possible in the Russian zone, since the extensive dismantling of factories in this area has had a great effect on the general picture of rubber production. The German rubber industry was formerly concentrated in four large centers. These were North Germany, including Hannover and Hamburg; Rhineland-Westphalia, including Dusseldorf, Cologne, and the Ruhr territory; Southern Germany, with Mannheim, Frankfurt-a.-Main and Munich; Central Germany, including Saxony and Thuringia; and Greater Berlin.

Of these sections, the most important, lower Saxony, North Rhine, and Westphalia, including Hannover, are in the British zone of occupation. Rubber factories in these districts produced 51.3% of the total rubber output in 1936, and 57.1% of the total exports. The United States zone is next in importance, followed by the Russian zone, Greater Berlin and the French zone. The important buna factories are largely in the Russian, British and French zones. The American zone does not have any buna factories.

The British zone, in the first quarter of 1947, produced 2,000 tons of buna; the Russian zone produced 8,500 tons, while the French zone did not produce any rubber. In March of this year all buna production in Germany was halted, as it required too much coal, and the industry could not be run economically. Natural rubber replaced synthetic in Bizonia during 1947. Imports for 1947 totalled 13,000 tons; for the current year about 40,000 tons are expected in Bizonia.

### *Manufactures in Germany*

Production of rubber goods in Bizonia has shown an increase in the past few months, and in July, 1947, the production index was 46%, which compares with 28% in the corresponding period of 1946. In 1936, production of tires for motor vehicles reached 2,724,000 units out of a total of 3,852,000 units for the country. In 1946, 841,300 units were produced. In the first half of 1947, 394,000 units were produced, and it was expected that by the end of the year a further increase of 25% would be shown. A total of 386,000 automobile tubes and 1,848,000 cycle tires were produced in the first half of 1947.

The Soviet zone, however, presents somewhat a different picture. The structure of the industry has been changed, and now includes three elements: Soviet-owned, national factories and private factories. It is estimated that 64 to 68% of the rubber and asbestos plants in the zone are owned by the Government of the U.S.S.R.

In the province of Saxe-Anhalte, for example, there are 11 registered Russian firms. The largest of these is the S.A.G. der Gummi Industrie Kautschuk, with a capital of 600,000,000 rubles. This company embodies the buna factory at Schkopau. The General Administration of Soviet Foreign Property at the Foreign Trade Ministry of the U.S.S.R., and different Russian export and import associations, are listed as founders of this company.

The factories in Thuringia are combined in the S.A.G. Resino Technika in Erfurt, and include the firms Vollrath & Sohn, in Blankenburg, Thuringer Schlauchweberei und Gummiwerk, in Walterhausen, and Blodner & Vierschrodt and the Gothania Works of Gotha. The Chief of Administration of the Soviet Joint Stock Companies in Germany controls these companies.

The Chemical Division of the Industrial Administration in Dresden controls the 12 national rubber and asbestos factories in Saxony. These firms have no financial independence, and are allotted raw materials by the Industrial Offices. Sales are controlled by the Trade Offices.

*Kautschuk und Gummi* claims that according to American sources, rubber and asbestos goods worth 5,421,000 marks were sent from Bizonia to the Eastern zone in 1946. The Eastern zone, for its part, supplied rubber goods and articles to the Western zones amounting to 5,084,000 marks. For 1948, an arrangement in Berlin provides for the delivery by Bizonia of rubber goods worth 2,800,000 marks to the Eastern zone. The Eastern zone is to ship rubber goods worth 4,300,000 marks in 1948. It was pointed out that these quotas were based upon the relative productive capacities of the individual zones.

## New Production Unit For Ludox

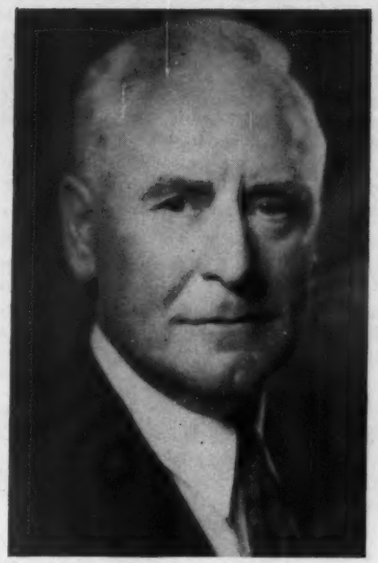
A new unit to manufacture Ludox colloidal silica has been completed at the East Chicago, Ind., works of the Grasselli Chemicals Department of E. I. du Pont de Nemours & Co., Inc. Deliveries of Ludox, described in a recent issue of RUBBER AGE, can now be made in any desired quantities. When first announced by DuPont, Ludox was available only on a small scale in 18% silica concentrations. As a result of additional research and development work, stable solutions with a concentration of 30% are now being produced.

## SALES AND PROFITS OF LEADING RUBBER MANUFACTURERS

| | 1947 Sales | 1946 Sales | 1947 net Income | 1946 net Income |
|---|---|---|---|---|
| Goodyear[a] | $670,772,647 | $616,508,162 | $25,544,943 | $36,211,784 |
| Firestone | 638,477,166 | 577,833,422 | 26,977,877 | 27,682,878 |
| U. S. Rubber | 580,968,091 | 494,753,028 | 21,753,317 | 23,207,941 |
| Goodrich | 410,180,839 | 361,471,149 | 23,231,063 | 25,207,871 |
| General[b] | 126,136,242 | 105,883,559 | 5,872,472 | 5,734,955 |
| Mansfield Tire[c] | 40,500,000 | 35,286,340 | 1,965,000 | 1,960,584 |
| Lee Tire | 37,197,883 | 32,150,137 | 2,402,305 | 2,153,338 |
| Armstrong Rubber | 34,266,408 | (d) | 2,033,646 | (d) |
| Dayton Rubber[c] | 34,000,000 | 32,624,567 | 1,800,000 | 2,101,524 |
| Seiberling | 32,116,490 | 33,275,546 | 421,614 | 1,124,141 |
| Mohawk Rubber | 8,242,955 | 10,088,446 | 499,618 | 1,044,689 |

(a) Includes Kelly-Springfield Co. (b) Includes Pennsylvania Rubber Co. (c) 1947 figures are estimates. (d) Because of the inclusion of a wholly-owned subsidiary, no exact comparison with a previous fiscal year is available.

### Honorary Degree For Banbury



F. H. Banbury

F. H. Banbury of Farrel-Birmingham Co., Inc., was awarded an honorary degree of doctor of engineering at Purdue University on June 13. A graduate of Purdue in the class of 1906, Mr. Banbury received this recognition for having attained international prominence in industry as the inventor of the mixer which bears his name. The original mixer was introduced in 1916, and since that time Mr. Banbury has obtained twenty-four additional U. S. patents covering improvements to the machine. Although retired since 1943 as head of Farrel-Birmingham's Banbury mixer department, Mr. Banbury still remains active in the capacity of consulting engineer and serves on the company's board of directors.

### Pelletized Good-rite Erie

B. F. Goodrich Chemical Co., Cleveland, Ohio, has announced the commercial production of Good-rite Erie rubber accelerator in a new, easy processing pelletized form. Formerly supplied as a rubber-soluble liquid, the product is now available in dustless, free-flowing black pellet form containing 50% active agent absorbed on easy processed carbon black. Liquid Good-rite Erie will be supplied hereafter only in limited quantities and upon special request. The new Good-rite Erie is said to offer the user several advantages: it allows easy handling and warehousing; its physical form makes it unnecessary to prepare a rubber masterbatch of the accelerator prior to use in a final compound, and it has good chemical stability.

U. S. Rubber is now putting nylon on the smallest electrical wire ever developed for wiring homes, offices, factories, hotels, and other buildings. Called Neolay Type RU, the new wire is reported to be 30% smaller in diameter than conventional building wire.

### Offers Laboratory Equipment

Pursuant to an order of the Court of Chancery of the state of Delaware, the Receiver of the Wilmington Chemical Corp., Wilmington, Del., will offer for sale at public auction all of the rubber laboratory equipment and all other personal property of the company on July 17, at the County Court House, Wilmington, Del. Not included in this sale are the real estate, buildings, fencing, oil burner and boiler, and storage tanks and piping. The assets to be sold include a rubber mill, a Banbury Mixer, aging ovens, air compressor, Scott Plastometer, Scott Tester, arbor press, etc. The Receiver of the corporation has received an offer of $15,000 for the real estate and buildings of the company, located at Miller Road and Thirty-Second St., in Wilmington. Buildings on approximately 1.02 acres of land include a one-story rubber testing laboratory, and a boiler house. This offer is for the land, buildings, fencing, oil burner, and boiler complete with storage tanks, all piping and electrical wiring in place. The Receiver will apply to the courts for permission to accept this offer on July 22. Information concerning the property offered for sale may be had at the office of the Receiver, F. William Carr, North American Bldg., Wilmington 7, Del.

### Stabelan Distributor Appointed

The Stabelan Co., Toledo, Ohio, has announced the appointment of the Harwick Standard Chemical Co., Akron, Ohio, as national distributors for Stabelan, its stabilizer for PVC resins and resin copolymers. Under the name Stabelan, three types of stabilizers are being marketed through Harwick. These are Type A, for improvement of aging qualities of vinyl resins in sunlight; Type XL, for stabilizing action in high temperature processing as well as for ultra-violet and sunlight aging, and Type G, for use with organic reds in addition to stabilizing action under ultra-violet and sunlight, and for perfecting film clarities.

### Adopt "Texas" Trade Name

The Sid Richardson Carbon Co., Fort Worth, Texas, has adopted the name "Texas" for its line of high quality channel blacks. Three types are currently being produced: Texas E, for easy processing; Texas M, for medium processing, and Texas H, for hard processing. The word "Texas" is a derivation of the old Indian word "Tejas" which means friends.

### New Rubber Trade Members

Among new member companies of the Rubber Trade Association of New York, Inc., which maintains headquarters at 15 William St., New York 5, N. Y., are Belfour, Guthrie & Co., Ltd., and the Imperial Commodities Corp., both of which have joined the dealer's group, and the J. Berlag Co., Inc., which has joined the brokers' and agents' group.

### New Appointments at Bakelite

John D. Benedito

Bakelite Corporation, Unit of Union Carbide and Carbon Corp., has announced the appointment of John D. Benedito as manager of the newly-created Extrusion and Molding Materials Division of the Thermoplastics Department. A. F. Sward has been named manager of the Calendering Materials Division of the same department. For the past six years Mr. Benedito has been sales manager of Canadian Resins and Chemicals, Ltd., and before that was for nine years engaged in sales and service work on Vinylite resins as a technical representative of the Plastics Division of the Carbide and Carbon Chemicals Corp., another Union Carbide unit. Mr. Sward was formerly manager of the Calendering and Molding Materials Division of the Bakelite Corp. Expanding sales were responsible for splitting up the activities into two separate divisions.

### Monastral and Ramapo Blues

The Pigments Department of E. I. du Pont de Nemours & Co., Wilmington 98, Del., has announced the availability of two new all purpose blues for rubber and plastics, Monastral Blue BT-284-D and Ramapo Blue BP-173-D. These pigments are easily dispersible in rubber, and are also dispersible and compatible with vinyl resins and the usual plasticizers. They are said to provide extreme brilliance, great stability, chemical inertness, resistance to fading and freedom from bleeding.

### Plan Third Plastics Exposition

The Society of the Plastics Industry, Inc., will stage its Third National Plastics Exposition at Grand Central Palace in New York City from Sept. 27 to Oct. 1. Demonstrations of new processes and special machinery will be featured on a bigger scale than in past expositions. The show will emphasize the strides made by the industry since the initial display in 1946.

# NAMES IN THE NEWS

JOHN H. KELLY, JR., research director of the mechanical goods division of the General Tire & Rubber Co. at Wabash, Ind., has resigned that position to manage and direct three new concerns which will deal with metal finishing processes, foundry research and development, industrial plastic utility applications and low pressure laminated plastic-metal products.

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PAUL F. NIESSEN, research director of the Victor Manufacturing & Gasket Co., Chicago, Ill., has been appointed assistant factory manager of that concern.

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JOHN H. MATTHEWS, vice-president and director of Raybestos-Manhattan, Inc., has been elected to the Board of Directors of the Canadian Raybestos Co., Ltd.

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JOHN F. DALEY, general manager of the Pigments Department of E. I. du Pont de Nemours & Co., has been appointed general manager of the Organic Chemicals Department, succeeding EDMUND G. ROBINSON, who retired from active company service on July 1.

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WILLIAM R. MULLER, associated with the E. H. Jacobs Manufacturing Co., Danielson, Conn., since 1946, has been named vice-president and sales manager of Jacobs Rubber Products, Inc., a subsidiary company.

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ELEANORE FISHER HORSEY, formerly associated with the Hercules Powder Co., and the Borden Co., has been appointed to the staff of the Chemicals Division of the Glenn L. Martin Co. at Baltimore, Md.

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FRED W. RETZER, division foreman of the American Hard Rubber Company at Akron and associated with tthat company for 50 years, retired from active service on July 3.

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HAROLD J. EDMON, formerly manager of the Chicago branch, has been named manager of the Naugatuck Aromatic Division of the U. S. Rubber Co., succeeding M. G. Couderchet who has returned to France. Mr. Edmon will make his headquarters at New York.

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THOMAS R. TURNER has been appointed division sales representative of the Watson-Stillman Co., for the sale of hydraulic machinery in the Virginia, Maryland, Delaware, southern New Jersey and eastern Pennsylvania districts.

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F. KENNETH BRASTED, associated with the Rubber Manufacturers Association for the past five years as head of public relations, has left that organization and has joined the National Association of Manufacturers in New York City as personal assistant to EARL BUNTING, managing director.

DR. ELDON E. STALEY, formerly at Mellon Institute in charge of a group studying catalysis and instrumentation of the continuous GR-S process, has been named director of chemical research of the Commercial Solvents Corp.

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MELVIN A. WILSON, associated with the Goodyear Tire & Rubber Co. for the past 14 years, has been named development manager of that company's plant in Wolverhampton, England.

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W. MURRAY GALL, formerly associated with the American Hard Rubber Co. and the DuPont Rubber Laboratory, has joined the Luzerne Rubber Co., Trenton, N. J., as chief chemist.

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RAYMOND G. SCHIELE, associated with the General Electric Co. since 1937, has been appointed buyer for the Resin and Insulation Materials Division at Schenectady, N. Y.

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W. R. "DICK" HUCKS, until recently associated with the Office of Rubber Reserve as production manager of the synthetic rubber program, and before the war associated with the B. F. Goodrich Co., has joined the General Tire & Rubber Co. as chief chemist of its Waco, Texas, plant.

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HARRIS HART, associated with the Goodyear Tire & Rubber Co. for the past ten years, has left for Sweden where he will act as technical service manager at the company's Norrkoping plant.

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DWIGHT B. ELDRED, who joined the U. S. Rubber Co in 1941 as supervisor of associate dealer sales, has been named assistant sales manager of the company's U. S. Tires Division. He will make his headquarters at the New York office.

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H. L. ARBOGAST, formerly manager of the rubber department for the Phoenix Manufacturing Co., at Joliet, Ill., has joined the technical staff of Van Cleef Brothers, Chicago.

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ROBERT E. SMITH, formerly with the technical staff of the Witco Chemical Co., is now with the Plaskon Division of the Libby-Owens-Ford Glass Co., Toledo, Ohio, as a development chemist.

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A. R. WOERNLE, formerly assistant technical director of the McCreary Tire & Rubber Co., has joined C. K. Williams & Co., Easton, Penna., as chief of the rubber laboratory.

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D. H. EZELL, associated with the Duralac Chemical Co., Newark, N. J., for the past 12 years, has joined the C. J. Osborn Co., New York City, in a technical sales capacity.

DONALD F. FRASER, who has been manager of the rubber division of the Monroe Auto Equipment Co. for the past few year, has left that organization to join the Queen City Tulatex Corp., Burlington, Vermont, as general manager.

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HARRY WILCOCK, for many years chief chemist of the Bristol Manufacturing Corp., is now associated with the Fibre Leather Manufacturing Corp., New Bedford, Mass., in a similar capacity.

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J. F. MANION, formerly associated with the Rome, N. Y., plant of the General Cable Corp., has joined the Detroit, Mich., plant of the Essex Wire Corp. as rubber supervisor.

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CHARLES A. ROUNTREE, formerly assistant manager of the Seiberling Rubber Export Co., has been appointed sales manager of the export division of the Inland Rubber Corp., Chicago, Ill.

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SIMON COLLIER, Director of Quality Control of Johns-Manville Corp., has been elected a member of the Board of Directors of A.S.T.M. for a three-year term. MR. COLLIER has also been elected Executive Secretary of the American Society For Quality Control.

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W. T. CLAYTON, formerly manager of the Goodyear Tire & Rubber Company's Wingfoot Homes factory at East St. Louis, Mo., has been appointed plant manager of the company's factory in Norrkoping, Sweden, succeeding JOHN J. HOESLY, who returns to Akron for reassignment.

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G. THEODORE BARKS, formerly associated with the U. S. Rubber Co., as division superintendent of the Fisk plant at Chicopee Falls, Mass., has joined the Monsanto Chemical Co. as general superintendent of the company's new vinyl chloride production unit in Springfield, Mass.

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JOHN L. COLLYER, president of the B. F. Goodrich Co., has joined the Industries Advisory Committee of the Advertising Council, Inc., and will represent the rubber industry on that committee.

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JOHN W. APGAR, formerly sales manager of the coating division of the Irvington Varnish & Insulator Company, Irvington, N. J., has been appointed assistant to the general manager of the division. DONALD MAY, who held the post of sales service manager of the division, succeeds MR. APGAR as division sales manager.

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CARL W. VIRGIN, chief research chemist of the Vulcanized Rubber & Plastics Co., Morrisville, Penna., has been elected chairman of the Trenton Section of the American Chemical Society.

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FRANCIS F. VILLA, formerly associated with the Royal Electric Co., Pawtucket, R. I., has joined Cords, Ltd., Newark, N. J., as chief chemist, replacing GERARD KUCKRO.

## BOSTON RUBBER GROUP HOLDS TWELFTH ANNIVERSARY OUTING

The 12th Annual Summer Outing of the Boston Rubber Group was held on June 18, at the Woodland Golf Club, Newton, Mass. Approximately 470 members and guests attended the affair and participated in such activities as darts, a softball game, horseshoes and horse racing and a golf tournament. A special dinner was served in the evening at which time winners of the sports contests were announced and prizes given. Winners were:

*Kicker Handicap,* F. Burger (Kleistone), A. B. Harding (Monsanto), R. E. McCurdy (Hood), J. J. O'Neill (Shell Oil), J. Magraine (New England Tape), H. C. Jones (N. J. Zinc), J. F. Lang (Bakelite); *Low Gross,* A. N. Clapp, A. E. Nelson (Hood), W. A. Maguire (United Carbon), C. H. Hamilton (Raffi & Swanson), W. B. Richardson (American Mineral Spirits).

*Low Net,* S. McCarthy (Shell Oil), A. W. Bryant (Binney & Smith), S. J. Szulik (Acushnet Process), T. W. Ashley; *Nearest Pin,* W. A. Woodcock (Carbide & Carbon), D. P. Bryant (Resinous Products); *Longest Drive,* G. Milne; *Most 3's,* E. H. Kropel (C. K. Williams); *Most 8's,* T. N. Loser (Thompson-Weinmann); *Highest Score,* E. B. Hodgdon (J. T. Baker).

*Fewest Putts,* Sam Palais (American Resinous Chemicals); *Darts,* J. Stewart (Hood), C. M. Grafton (Goodall-Sanford); *Horseshoes,* P. L. Blanchard (Hood) and E. N. Weber (Hood); *Putting,* J. J. Mondino, H. D. Bainbridge (Boston Varnish), E. Izmirian (Acushnet Process).

The Outing Committee was headed by Ralph McCurdy (Hood), who was assisted by Thomas Edwards (Acushnet Process), Harry Atwater (Hood), and John Andrews (Cabot).

### Graduate Fellowships Offered

The U. S. Rubber Co. has announced it is this year again offering the graduate fellowships in chemistry established at ten leading universities in 1947. In making the announcement, Herbert E. Smith, president, said the company is also establishing a graduate fellowship in physics at the University of Virginia. Universities which have accepted the fellowships in chemistry are: California Institute of Technology, Cornell University, Harvard University, Massachusetts Institute of Technology, Northwestern University, University of California, University of California at Los Angeles, University of Chicago, University of Minnesota, and the University of Wisconsin. The fellowships will be available for the academic year starting July 1, 1948. Each of the ten who receive chemistry fellowships will be provided with $2,200 a year if single, or $2,800 if married, of which $1,000 will go to the university to cover the cost of tuition. The recipient of the fellowship in physics will receive $1,500. Holders of fellowships will be selected by the universities.

### Rhode Island Holds Outing

Approximately 115 members and guests of the Rhode Island Rubber Club attended the summer outing held on June 24, at the Pawtucket Golf Club, Pawtucket, R. I. A dinner and a golf tournament were features of the day. Door prizes were awarded to all. Winners of the golf tournament were: *Low Gross,* William Maguire (United Carbon); *2nd Low Gross,* R. S. Newell (Respro) and F. F. Salamon (Binney & Smith); *Kickers Handicap,* W. Platt (Columbia Chemical), S. Beort and A. Perry (General Latex); *Most 5's,* W. Stafford; *Most 6's,* H. Hanson; *Most 7's,* R. S. Sanderson; *High Gross,* W. Coleman.

## NEW YORK RUBBER GROUP ATTRACTS 140 TO OUTING

Approximately 140 members and guests attended the Annual Outing of the New York Rubber Group, held at Doerr's Grove, Millburn, N. J., on Saturday, June 26. Facilities were exceptionally good, and a good time was had by all. Food was served all day long, with plenty of beer, and the day's activities were topped off by a chicken dinner.

Winners of the numerous events, all of whom received prizes provided by the group, included the following: *Horseshoe Pitching,* W. L. Lamela (Okonite) and R. S. Potter (Armstrong Rubber); *Boccie,* George McNamara and Warren Carter (Pequanoc Rubber); *Darts,* Bert Wilkes (Cabot) and George McNamara (Pequanoc Rubber); *Baseball Throw,* Russ Kurtz (DuPont); *Egg Throw,* W. S. Kane (Okonite) and Ted Bogosian (American Hard Rubber); *Fat Men's Race,* George McNamara (Pequanoc Rubber); *Three-Legged Race,* M. J. D'Asaro and R. J. Margles (Wolf-Alport Chemical); *Sack Race,* R. J. Margles. The soft ball game was won by a team captained by Cliff Ayers (Flintkote), while the tug-of-war went to the team headed by George Jerolman (Armstrong Rubber).

Charles T. Jansen (Rubber Age) acted as chairman of the Outing Committee, with the following in charge of the various contests: *Soft Ball,* Howard Ling (Naugatuck Chemical); *Darts,* M. E. Lerner (Rubber Age); *Boccie,* Bob Carroll (R. E. Carroll, Inc.); *Horseshoes,* W. L. Lamela (Okonite); *Three-Legged Race, Fat Men's Race and Baseball Throw,* Cliff Ayers (Flintkote); and *Sack Race, Egg Throw* and *Tug-of-War,* Harry Eckhardt (Lea Fabrics). Others who assisted in arranging the outing included M. R. Buffington (Lea Fabrics) and Pete Murawski (DuPont).

*Members and guests of the Boston Rubber Group at the Twelfth Annual Summer Outing. (Photos by George Warren Smith).*

## BULL ADDRESSES DETROIT GROUP ON RECENT TIRE DEVELOPMENTS

Approximately two hundred and fifty members and guests of the Detroit Rubber and Plastics Group attended the Spring Meeting, held on May 21, at the Detroit-Leland Hotel, Detroit, Mich. Speaker for the evening was Dr. A. W. Bull, Director of Development, Tire Division, U. S. Rubber Co., who spoke on "New Tire Developments." Guests of the evening included outstanding automobile and truck body and chassis engineers and tire and rim engineers from leading manufacturers.

At a business session preceding Dr. Bull's address, Dr. C. W. Selheimer, chairman of the group, announced plans and program for the Fall Meeting to be held on October 1, at which time L. Sperberg of the Phillips Petroleum Co. will speak on "Carbon Black in Low Temperature Chemical Rubber."

In his address, Dr. Bull stated that the function of a tire is to suport a vehicle on a cushion of air. Since no other practical means exists, the air is held inside an inner tube, which is held to proper size by the tire casing. The casing may be compared roughly to a suspension bridge. The main cables of the bridge are analagous to the bead wire bundles. The bridge load is supported by light cables attached to the main cables, whereas in the tire, the load is carried by cords attached to the beads. These cords do not take a straight line position, nor are they parallel as in the bridge. The cord angle is a very critical part of the tire design.

The tire must stand up under severe flexing abrasive wear and all kinds of atmospheric conditions. As yet no material has been found to surpass rubber in meeting the tread sidewall requirements.

By means of slides, the speaker indicated trends from 1908 through 1946 covering tire cost and tire mileage. The rubber industry has consistently reduced the tire cost per mile over this span of years. More important still, in the face of rising material and labor costs, tire prices are substantially the same as prewar. This has been accomplished largely by economics in manufacturing.

### *Desirable Tire Qualities*

Dr. Bull discussed the desirable qualities of a tire in some detail, and spoke of obtaining an optimum balance of these features. Fundamental studies in tire construction and design were responsible for the introduction of a new type of tire to automobile users. It was brought out in 1946, the first of its kind to be put on the market by any tire manufacturer.

It embodied the principle of a narrower, flatter tread on a somewhat larger carcass, so designed as to give less shock, greater stability, comfort and blow-out resistance. Appropriately, it was named the "Air Ride." This tire was first introduced as a replacement tire, but is being widely adopted for use on new cars as original equipment.

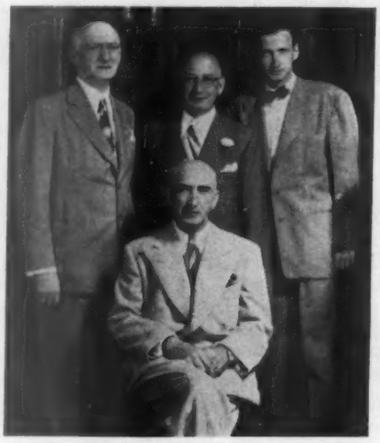
The synthetic picture is changing at the present time, Dr. Bull noted. Formerly, the GR-S produced in this country was inferior to natural rubber in these properties: heat generation, abrasion resistance, cut growth and tensile strength. New low temperature polymerized rubbers are distinctly improved in all four qualities. It appears as though treads can be made from this new material which will surpass the performance of natural rubber.

Inner tubes of butyl rubber are remarkable in their ability to hold air, but suffer in comparison with natural rubber in one limited service condition. Extremely low service temperatures coupled with low pressures cause a condition referred to as "low temperature buckling." This affects only about 10% of tire usage. It is hardly sufficient to cause the abandonment of this material, as these deficiencies are being overcome by experimentation.

At the conclusion of Dr. Bull's interesting and informative talk, a movie was projected. This consisted of a travelogue picturization entitled "Wheels Across India" produced by the Dodge Brothers Division of Chrysler Corp., depicting the country and the peoples of India.

### Gathering of the Muehlsteins

Pictured at a recent informal gathering in New York are the above members of the Muehlstein family, all active in the operation of H. Muehlstein & Co., Inc.,



nationally-known rubber and plastics firm. Seated in front is Herman Muehlstein, while standing left to right are Charles Muehlstein, Julius Muehlstein, and Herbert J. Muehlstein, son of Charles.

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An 18-page booklet describing briefly the wide range of products manufactured by the Chemical Department of the General Electric Co., Pittsfield, Mass., has been issued. Products of the plastics, resin and insulation materials, metallurgy and compound division are described.

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C. D. COUCH, formerly associated with Comprehensive Fabrics, Inc., and Celanese Corp., has been appointed sales director of the coated fabrics division of the Atlas Powder Co., Stamford, Conn.

## PHILADELPHIA HEARS REYNOLDS ON LOW TEMPERATURE RUBBERS

The June 11 meeting of the Philadelphia Rubber Group was held at Kugler's Restaurant, Philadelphia, Penna. Principal speaker of the evening was Dr. W. B. Reynolds of the Research Department, Phillips Petroleum Co.

Dr. Reynolds spoke on the subject "Philprene Low Temperature Rubber." The speaker stated that butadiene-styrene copolymers prepared at low polymerization temperatures, i.e., 41° F. and 14° F., have shown phenomenal wearing characteristics in passenger and truck tire treads.

Experiments at Phillips' laboratories have indicated that Philprene A (41° F.) is rated from 20 to 40 per cent superior to GR-S while Philprene B (14° F.) is superior even to Philprene A, Dr. Reynolds said. When compounded with HAF black (Philblack 0) these new chemical rubbers are substantially superior to natural rubber for tire treads.

The low temperature polymers are believed to differ appreciably in structure from GR-S, which is manufactured at 122° F. They are known to possess a substantially higher number average molecular weight and to contain much less very low molecular weight or "soupy" polymer. However, more importantly, X-ray studies indicate that the low temperature polymers are more linear in character with less branching and cross-linking. This is believed to contribute importantly to their better flex life and abrasion resistance.

Polybutadiene and low styrene copolymers prepared at 14° F. and 0° F. show pronounced crystallinity when cooled below 32° F. and a preferred orientation effect upon stretching, Dr. Reynolds said. These properties are suggestive of natural rubber and are quite unlike those of GR-S, he noted.

### Akron Holds Annual Outing

Over 600 members and guests of the Akron Rubber Group attended the annual summer outing held on June 18 at the Lake Forest Country Club, Hudson, Ohio. Features of the day were drawings for door prizes, a gala dinner and golfing contests. A total of 232 members took part in the golfing contests, and the following members won in the different events:

*Low Gross,* A. McGeorge and C. A. Damicone; *Second Low Gross,* M. H. Kirkland and H. B. McCreary; *Low Gross, First Nine,* William Whittaker; *Low Gross, Second Nine,* Neil Sherwood; *High Gross, First Nine,* Charles Sitz; *High Gross, Second Nine,* T. T. Wilson; *Low Net,* J. C. Wood; *Longest Drive—10th Hole,* H. B. McCreary; *Longest Left Handed Drive—10th Hole,* F. Ellis; *Closest to Pin,* R. J. Easton.

*Blind Bogey,* A. W. MacAlonan, A. Parsons, H. Fink, R. Jones, T. Viock, R. Metzger, R. W. Hobson, C. J. Adelman, C. Lehto; *On Ninth Green In One Shot,* G. Lenhart, C. A. Damicone, F. Leonard, C. Brees, F. B. Shaw, F. E. Palmer, J. M. Wallace, William Vecsey, P. M. Eyster, H. E. Eckert, C. Lehto and J. M. Kern.

## NO. CALIFORNIA HEARS STEWART ON SILICONE FLUIDS AND RUBBERS

Approximately 40 members and guests, including Miss Ethel Levene, secretary of the newly-formed Washington Rubber Group, attended the June 24 meeting of the Northern California Rubber Group, held at the Claremont Hotel, Berkeley, Calif. Principal speaker of the evening was Robert B. Stewart of the Dow Corning Corp., who spoke on the subject, "Silicone Fluids and Silicone Rubbers."

At the business session of the meeting, Victor F. Sagues, of the Sacomo Manufacturing Co., resigned as secretary of the Group because of the press of business affairs. He was succeeded by Robert R. James, of the Rubber Laboratory, Mare Island Naval Shipyard, who was appointed to this office for the remainder of 1948. William E. Elwell, of the California Research Corp., committee chairman for the summer outing, reported that arrangements have been completed for this affair which will take place at Curry Creek Park in Oakland, Calif., on August 15.

In his address to the Group, Mr. Stewart stated that silicone fluids are being used by the tire and rubber industry as mold lubricants offering the advantages of cleaner molds, added lustre, economy and ease of application with resultant uniformity of product. These advantages are gained because of the inherent heat stability, the inertness and the incompatibility of the silicones with the synthetic elastomers.

The silicone mold release fluid is diluted with petroleum solvents or applied from a water emulsion. Normally, a concentration of between ½ and 1% silicone is desirable, it being important to avoid excessive concentrations. Other miscellaneous uses for the silicone fluids in rubber manufacturing plants include corrosion prevention of molds and the improvement of the life of automatic connector gaskets.

### *Discusses Silastic Rubber*

Silastic, or silicone rubber, is resistant to abnormally high and low temperature applications, Mr. Stewart said, and also offers excellent resistance to weathering, oxidation, ozone, hot lubricating oils and a variety of chemicals. Electrical properties are comparable to organic rubbers at room temperatures and are superior at high temperatures to the best resilient insulating materials available.

The molecular structure of the silicone rubber is built on a silicon-oxygen linkage common to all silicone polymers and has a bond strength about 1½ times that of the carbon to carbon linkage found in organic rubbers. Freedom from unsaturation also adds to the inherent heat stability and inertness of Silastic. All types of Silastic will withstand continuous exposure to at least 300° F. This is a minimum advantage of 100° F. over organic rubbers; if protected from the atmosphere, 300° to 500° F. continuous temperature will be withstood as well as intermittent exposure to temperatures in excess of 500° F.

Mr. Stewart noted that Silastic is especially useful as a gasketing material in the aircraft industry and is being adopted to automotive uses. It is frequently reinforced with Fiberglas for making flexible ducts and couplings as well as gasketing material. "Grippmitts," deluxe household hot pad holders, are made from sponged Silastic and offer the housewife heatproofness, waterproofness and slip-proofness.

Other applications for Silastic depend on its unique properties of inertness, freedom from contamination, superior weathering and aging qualities, low temperature flexibility and hot oil resistance. In the course of his address, Mr. Stewart illustrated his different points with lantern slides and samples of silicone fluids and rubbers.

### Dreyfus in New Location

The L. A. Dreyfus Co., has begun partial operation at a new plant being constructed at Oak Tree, N. J., for the manufacture of gutta-percha compounds. The plant, scheduled to be completed within two months, consists of a factory, administration, warehouse and boiler house structures. A large parking area and a railroad siding have been provided. The factory, which has a floor area of over six acres, is a one-story, monitor-type building with a continuous glass block band in the upper portion of the exterior walls. The administration building is two stories in height and contains a basement garage, lunchroom and locker facilities, and a large shipping area. On the second floor, the firm's executive offices will be located.

### Ontario Group Holds Field Day

The Ontario Rubber Section of the Chemical Institute of Canada held its first Annual Field Day on June 5 at the Rouge Hills Golf and Country Club in West Hills, Ontario. Members and guests participated in a recreational and dinner program. Feature of the day was a golf tournament, with prizes being awarded to winners in numerous events. Among the winners were the following:

*Low Gross,* Carl Croakman (Binney & Smith); *2nd Low Gross,* Charles Buckley (Dunlop); *3rd Low Gross,* Al Wright (Dunlop); *Low Net,* R. E. Nunn (Dunlop); *2nd Low Net,* Bill Tomlinson (Dunlop); *3d Low Net,* H. M. Payette (Dunlop); *Low Gross—1st Nine,* S. Murray (Gutta Percha); *2nd Low Gross—1st Nine,* Bill King (Seiberling); *Low Gross—2nd Nine,* J. Bullard (Dunlop); *2nd Low Gross—2nd Nine,* Art Henley (Dunlop).

*Low Net—1st Nine,* H. Current; *Low Net—2nd Nine,* Dave Farmer (Dunlop); *Nearest to the average for 18 holes,* Sid Parkes (Dunlop); *Nearest to average for 1st nine holes,* Bob Torian (Goodyear); *Nearest to average for 2nd nine holes,* Ken Cunliffe (Dominion); *2nd Most Pars,* T. B. Craig; *Most Pars,* Bill Moncur (Seiberling); *Most 5's,* R. J. Tipton (Seiberling); *Most 6's,* J. W. Ansley (Seiberling).

*Low Man on the 1st,* C. R. Peterkin (Dunlop); *High Man on the 1st,* B. Johnston (Dunlop); *Highest Score,* Bob Partington (Goodyear); *Highest Hole,* R. Holt (Dunlop); *Kicker's Handicap,* Alex Milne (Dunlop).

## NEW TYPE OF BALING CLOTH FEATURES COST AND TIME ECONOMY

Jefco Jute Tubing, a new kind of seamless, continuous, tubular baling cloth, featured by the J. E. Fricke Co., of Philadelphia, Penna., is said to be attracting wide interest among cost-conscious shippers because of its unusual economy features. Due to its unusual two-way stretch, the tubing provides smooth, close-fitting coverage for packages of practically all sizes and shapes, without costly hand-finishing operations. Users report savings of up to 80 per cent in baling time. Jefco Jute Tubing is durable, tough, and offers maximum abrasive resistance to protect packages in shipment. It is available in widths to fit a wide assortment of package sizes.

### Synvarite RC Resins for Rubber

The Synvar Corporation, Wilmington 99, Delaware, is currently marketing a complete line of Synvarite RC resins for rubber compounds, cements and adhesives. This group of resins is especially formulated for compounding with GR-S and the nitrile rubbers, improving mechanical properties and processing, and combining hardness, chemical, solvent and heat resistance. They may also be utilized in improving the hardness, chemical and heat resistance of natural rubber and neoprene, as well as in the compounding of rubber cements. Synvarite RC Resins are of the phenol-formaldehyde type, modified so as to make them compatible with these various rubbers. They can be supplied in three forms, as a base thermoplastic resin in lump or granular form, as a base thermoplastic resin supplied in the form of a fine powder, or as a thermosetting resin containing the necessary amount of hexamine and supplied in powder form. The amount of hexamine in the latter case can be modified to meet the requirements of the user. Synvarite RC-15H, RC-16H and RC-18H are recommended by the company for GR-S; Synvarite RC-2OH is recommended for neoprene, and Synvarite RC-6H and RC-2OH for the nitrile rubbers.

### Organizing Chemical Information

Complicated chemical names are eliminated in a system for recording and finding chemical information recently introduced for research purposes by the Zator Co., 79 Milk St., Boston 9, Mass. Called Chemical Zatocoding, the new system makes use of the structural formula of complicated organic compounds to find laboratory information on their properties. Mechanically-sorted information cards have random pattern notches in their edges to describe the compound point-by-point throughout its structure. Compounds as complicated as hormones or vitamins are easily described in this manner. Chemical, biological, or physical properties of the compound are noted with additional notches in the edge. A small mechanical selector rapidly segregates those cards bearing any combination of chemical or other properties.

### Changes At Goodrich Chemical

B. F. Goodrich Chemical Co., Cleveland, Ohio, has announced three new appointments in its advertising department. George B. Koch has been named advertising and sales promotion manager, succeeding H. W. Brinkerhoff, former advertising manager, and J. L. Whiteman, former sales promotion manager, who have left the company to enter the publishing business in Cleveland. Mr. Koch has handled publicity since joining the company in early 1946. John F. Moriarty, who formerly directed advertising production, succeeds Mr. Koch in the publicity department. John F. Amos, formerly in the company's technical service library, has been appointed a technical writer.

### Jay Appointed Plant Manager

Richard A. Jay

Richard A. Jay has been appointed plant manager of the Goodyear Tire & Rubber Co. factory at Lincoln, Nebr., replacing Fred R. Shaw, plant manager there since the plant's opening in 1946, who has been assigned other duties. Mr. Jay is a native of Blakesburg, Ia., and attended Iowa State College, where he was graduated with a degree in chemical engineering. He joined Goodyear in 1939 as a member of the company's production squadron at the Jackson, Mich., plant. The following year he was transferred to Akron where he became supervisor in mechanical goods production. Mr. Jay entered the Navy in February, 1943, serving until June, 1946, when he returned to his former position at Goodyear. Later, he was on special assignment out of the factory manager's office until named to his new duties.

### Declares Rubber Pact "Dead"

F. D. Ascoli, chairman of the Rubber Growers' Association, revealed at an explanatory press conference on the three-day Rubber Technology Conference recently held in London, that according to the highest authorities the Anglo-United States Geneva tariff pact "has been put into cold storage forever." The proposed Geneva pact would supposedly reduce British colonial tariffs in return for reduced U. S. synthetic rubber production. The U. S. synthetic rubber production decided at Geneva was above, not below, current production and the pact lapsed pending further discussion.

### Appointed General Manager

Harold F. Smiddy has been appointed general manager of the Chemical Department of the General Electric Co., with headquarters in Pittsfield, Mass. Since March of this year, he has been on the staff of Charles E. Wilson, president of the company.

### Willshaw Returns to England

H. Willshaw, chief engineer of the rubber factories of the Dunlop Rubber Co., Ltd., returned to England recently after a six-week trip to the United States and Canada, during which he was accompanied by Frank A. Davenport, deputy chief engineer of the new Dunlop plant at Speke, near Liverpool, England. The two engineers visited the Canadian and Buffalo, N. Y., plants of the Dunlop organization as well as various other rubber and automotive plants in the Detroit and Akron areas. Mr. Willshaw is a frequent visitor to the United States. He lived in Buffalo for a number of years after selecting that city for the location of the American Dunlop factory. Concerning his recent trip, Mr. Willshaw, in a statement made to a representative of RUBBER AGE in London last month, was overwhelming in his thanks for the courtesy and co-operation extended to him by rubber factory executives in the United States, particularly in the Akron area where he has many friends in the industry.

### Westvaco Changes Corporate Name

Westvaco Chlorine Products Corp., New York City, together with its subsidiary companies, the Warner Chemical Co., the Magnesol Co., and the California Chemical Co., has changed its corporate name to the Westvaco Chemical Corp., effective April 29. The new name was chosen the better to delineate the expanding scope of company activities. Westvaco is a leading producer of chlorine products, barium chemicals, magnesium chemicals, bromine and brominated compounds, organic insecticides, commercial sodium and potassium phosphates, absorptive magnesium silicates, and other products. Company offices are located at 405 Lexington Ave., New York 17, N. Y.

### Weather Testing Facilities

Expanding its facilities for weather testing materials and products of all kinds, the United States Testing Co., Inc., Hoboken, N. J., has completed arrangements with a proving ground operation in Miami, Fla., for actual exposures to sun, wind, rain and salt water. This area was selected because the number of days of intense sunshine, free from cloud interference, gives wide scope to weathering tests at various seasons of the year. New equipment is being added to the proving ground which, instead of approximate figures heretofore available for under glass tests, will make exact radiation compilations.

### Plan Rubber Thread Plant

The American Wringer Co., Woonsocket, R. I., will establish a plant at Raeford, N. C., for the manufacture of rubber thread. It is estimated that the plant will cost approximately $150,000. The company plans to produce rubber thread for knitting purposes at this new plant.

### Simoncic Changes Name

Anthony J. Simonson

Announcement has been made by Anthony J. Simoncic, technical representative of the Shell Oil Co., New York City, that as of June 28, he has Americanized the spelling and pronunciation of his name to Anthony J. Simonson. The change, he says, has been made solely for the convenience of his customers and friends who had trouble in learning to spell and pronounce his former name. A native of Kansas, Mr. Simonson is a graduate of Kansas State University and has been in the employ of Shell Oil since August, 1943, principally responsible for the promotion of the company's Dutrex materials.

### Akron Section's Birthday

The Akron Section of the American Chemical Society celebrated its 25th anniversary at a dinner meeting in the A. Polsky Co. tea room on June 24. The section honored as dinner guests founder members of the group which was chartered in 1923. Of the original 47 charter members, 22 are still in the Akron district, 7 are dead, and 18 have left Akron. The present membership is about 850. Some of the charter members of the section are Dr. R. P. Dinsmore (Goodyear), Dr. L. B. Sebrell (Goodyear), Harry L. Fisher (U. S. Industrial Chemicals), Ira Williams (Huber), E. R. Bridgwater (DuPont), Norman A. Shepard (American Cyanamid), H. B. Pushee (General Tire), Webster N. Jones (Carnegie Institute of Technology), George Oenslager, and P. W. Litchfield (Goodyear).

### Planning Canadian Factory

The Cressall Tyre & Rubber Co., Ltd., of New Malden, Surrey, England, is reported to be planning the establishment of both a reclaimed rubber and a molded goods factory in Canada. Mr. A. A. Cressall, head of the company, recently paid a visit to the United States and Canada in connection with plans for the proposed Canadian plant.

### Expand Machinery Service

According to a joint announcement issued by Hecht, Levis and Kahn, Inc., and the Foram Management Corp., both of 76 Beaver St., New York 5, N. Y., the latter company is now in a position to offer an improved and expanded service in connection with the purchasing and export handling of all machinery and materials. Hans Brunner, well-known figure in the rubber industry, is now acting as a specialist for the company in the rubber and plastics machinery and engineering fields. The Foram Management Corp. was organized in 1938 and became associated with Hecht, Levis and Kahn, Inc., in 1945, at which time it branched out into the field of rubber and plastics, trading on the experience of the latter organization. Among machinery suppliers the Foram concern now represents exclusively in the export field are the Erie Engine & Manufacturing Co. and the Burke Electric Co. Company officials revealed that they are now planning and installing complete equipment for two rubber and plastics plants, one each in Chile and Brazil. Officers of the Foram concern include G. P. Petersen, president; W. E. Bossong, vice-president, and G. Kohlman, manager, engineering division.

### General Aniline Offers PVM

General Aniline and Film Corp., New York City, has announced that it can now supply polyvinyl methyl ether (PVM) in pilot plant quantities. This polymer is said to be soluble in a variety of organic solvents as well as in cold water. It precipitates out of water solutions in adhesive masses when heated to about 35° C. and redissolves below that temperature without loss of original properties. The product is especially suitable as a nonionic heat sensitizing agent for natural and synthetic latices. It may be useful as a tackifying agent for adhesives and cements; as a binding agent in textiles, ceramics and paints; as a plasticizer for cellulose nitrate and chlorinated rubbers; and in other applications. Polyvinyl Methyl Ether (PVM) is available in an unmodified form as a highly viscous mass, or as 80% PVM solution in water or 50% PVM solution in water for convenient dispersion.

### Offer Five New Vinyl Ethers

Carbide and Carbon Chemicals Corp., New York City, has announced the production of five new vinyl ethers in addition to the three that have been in commercial production. The eight compounds now include vinyl methyl, ethyl, isopropyl, n-butyl, isobutyl, 2-methoxyethyl, 2-chlorethyl, and 2-ethyl-hexyl ether. According to the company, any of these eight can be made readily in large industrial quantities. These vinyl ethers can be polymerized in either the liquid or vapor phase. With the hydroxyl groups of cellulose and other polyhydroxy compounds, the vinyl ethers react to yield mixed acetals having good water and alkali resistance.

### Thies Heads Chemical Division

Herman R. Thies

Herman R. Thies, formerly manager of the Plastics and Coatings Department, Goodyear Tire & Rubber Co., has been appointed head of the newly created Chemicals Division for the sale of synthetic rubber and its combination with other raw materials. Mr. Thies, who has been associated with Goodyear since 1930, serving in various capacities including the post of assistant director of research, is a graduate of Phillips University and the University of Chicago. W. H. Aiken, formerly assistant to Mr. Thies in the Plastics and Coating Department, has been appointed to a similar position in the Chemicals Division. All personnel of the Plastics and Coating Department have become members of the Chemical Division staff.

### U. S. Testing Absorbs Crystal

The U. S. Testing Co., Hoboken, N. J., recently completed arrangements to take over in specific fields the research and development activities of the Crystal Research laboratories of Hartford, Conn. This latter company developed the Ultra-Sonorator, the first laboratory apparatus for utilizing commercially the sound waves in ranges above those audible to the human ear. Ultrasonics have already been used commercially for detecting flaws in metals, plastics and other materials by sending sound waves through the mass and charting the time of the rebound, and in many other applications.

### Vinyl Printing Inks Offered

A complete line of vinyl printing inks, including clear vehicles, thinners, light-fast non-cracking pigment concentrates, delustre coats and dye solutions, was announced recently by the American Resinous Chemicals Corp, Peabody, Mass. All are available for various methods of application, including rotogravure and silk screen printing as well as hand topping, or splashing on film or vinyl coated fabric, company officials stated.

### Rubber Dragnet Chaffing Gear

Sheets of its Armorite rubber, especially compounded to resist abrasion, are being used as dragnet chaffing gear by one of the large commercial fishing companies operating near Seattle, Washington, it is reported by the B. F. Goodrich Company,

Akron. Fishermen are shown here examining the Armorite, which for 30 months has been attached to the bottom of the tapered net. Tanned bullhide had previously been used in this service, but the Armorite rubber lasts four times as long, it is claimed. The 48-inch by 84-inch sheets used are 3/16ths of an inch thick.

### Quebec Holds Golf Tournament

The Fourth Annual Golf Tournament of the Quebec Rubber and Plastics Group was held on June 25 at the Granby Golf and Country Club, Granby, Quebec, Canada, with approximately 60 members and guests in attendance. At an evening dinner party, S. Stuart MacLean, Chairman of the Group, announced that the Group Chairman for 1949 would be Frank D. Cobbett of the Canadian General Electric Co., Montreal, Que. New members on the Executive Committee included the following: H. A. Hencher (H. L. Blachford), G. Rea (Monsanto), R. M. Powell (Canadian Industries), W. Gedye (Miner Rubber), and H. Brennian (Dominion Rubber).

### 1948 Insulation Conference

The 1948 Conference on Electrical Insulation of the Division of Engineering and Industrial Research, National Research Council, will be held on October 27, 28 and 29 at the National Bureau of Standards, Washington, D. C. Plans are being made to arrange a program that will appeal to the wide range of interests of all who are working in problems involving dielectrics.

### Connecticut Plans Outing

The annual summer outing of the Connecticut Rubber Group will be held on August 14, at Scallins Grove, Long Hill, Conn. Golfing facilities will be available at a municipal course near the outing grounds.

### Dunlop's Plantation Position

According to a recent report by Sir George Beharrell, board chairman of the Dunlop Rubber Co., Ltd., the company's plantations in Malaya have recovered almost completely from the Japanese occupation. By the year-end, monthly production of latex was exceeding the highest prewar monthly record by 26% and the yields were considerably in excess of the minimum target of 1,000 pounds per acre. Sir George stressed the point that the progress was made in the face of serious difficulties.

### Uskon Pads For Gasoline Tanks

An electric heating pad made of electrically conductive rubber has been developed by the U. S. Rubber Co. for use as a cold-weather aid for engines by preventing the accumulation of ice in water-contaminated gasoline. Called Uskon, the conductive rubber is formed into pads which supply heat to a dehydrator produced by Erie Meter Systems, Inc., which removes water from fuel by a filtering process. The pads are wrapped around the large tank in which the filtering process takes place and a smaller tank where the unwanted water is deposited. The temperature of both gasoline and water is maintained at 38° F. Uskon has recently been put to other uses, including a radiant heating panel for heating homes, as reported in an earlier edition of RUBBER AGE.

### General Cable Raises Prices

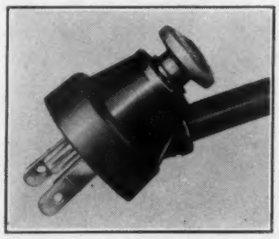
General Cable Corp. has announced an increase in prices of its principal wire and cable products by an average slightly over 5%, effective June 23. While some products are not affected, increases on some items range up to 13%. This is the first change in General Cable's prices since April 23, 1947, when it reduced prices by an average of approximately 6%. Present price rises were attributed to higher wages, together with substantial increases in the cost of freight, fuel, supplies and other items. At the same time the company announced that it had concluded a wage agreement with workers at its Perth Amboy and Bayonne, N. J., and St. Louis, Mo., plants for an 8% wage increase with a minimum of nine cents an hour, effective July 1.

LEONARD K. FIRESTONE, president of the Firestone Tire & Rubber Co. of California, is one of a group involved in a new daily newspaper publishing venture in Los Angeles. The new paper is not expected to be published until mid-1949.

J. P. SEIBERLING, president, Seiberling Rubber Co., has been elected to the board of trustees of Princeton University for a four-year term. He is a graduate of the Class of 1921.

### Neolock "105" Locking Plug

Neoline, Inc., 130 South Hewitt St., Los Angeles 12, Calif., has introduced a new type of locking plug, made of neoprene, that fits any standard outlet. Marketed as the Neolock "105" Locking



Plug, this new, patented plug requires no special receptacle or attachment. Slight finger-tip pressure on a plunger attached to a sliding wedge forces the prongs of the plug tightly against the contacts of the receptacle, locking the plug securely in a vice-like grip. The plug is unlocked by pulling out the plunger.

### Plastic Shipping Containers

Shipping containers for foods, made of a tough, thermoplastic material and insulated with light weight plastic foam, have been jointly developed by the U. S. Rubber Co. and the R. H. Bishop Co. of Champaign, Ill. The containers are being produced by the Bishop concern. The bottom, sides, lid, inner container and all internal bracing in the food shippers are constructed of the rubber company's Versalite, which is non-corrosive, has very low heat conductivity and is lighter in weight than any other known material suitable for this application. Important features of the thermoplastic material are high impact strength and a specific gravity of less than 1.1. The containers are completely insulated with Flotofoam, a plastic fotam that weighs less than one pound per cubic foot. Because of its excellent insulating properties, the walls of the shippers can be made thinner than usual, increasing the storage capacity. The Bishop company will soon start production on new home freezers and low temperature commercial display units that will also use the thermoplastic Versalite and Flotofoam insulation.

The article "Chemical and Physical Properties of Philblack Carbons," which appeared in the April, 1948, issue of RUBBER AGE, has been made available in reprint form by the Rubber Chemicals Division, Phillips Petroleum Co., Akron 8, Ohio. Copies may be secured without cost on request.

Hewitt-Robins, Inc., recently announced the occupancy of new executive and sales offices consisting of the entire 18th floor at 370 Lexington Avenue in New York City. The office seating has been custom designed to make use of the company's new Restfoam cushioning.

## What the Reviewers Say About the New Book,

# "RECLAIMED RUBBER"

### The Story of an American Raw Material

*by* **JOHN M. BALL**

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### Hack Appointed To NSR Board

William T. Hack, a New York chemical engineer and former Government official, has been appointed director of the newly-created Division of Chemicals, Rubber and Allied Products of the National Security Resources Board, Chairman Arthur M. Hill announced recently. For the past two years, Mr. Hack has been special assistant to the vice-president of the Ethyl Corp. of New York. Previous to this position he served as assistant production manager of the synthetic rubber section of ORR from August, 1945, to March, 1946, and as production manager of the butadiene-from-alcohol section of the same organization from 1942-45. He has also been associated with the Carbide Carbon & Chemical Corp. in South Charleston, W. Va. Mr. Hack received his degree of bachelor of science in chemical engineering at Princeton University in 1935, and for one year thereafter attended the graduate school of business administration at Harvard University. He is a member of the American Institute of Chemical Engineers and the American Chemical Society.

### New Coated Fabrics Laboratory

E. I. du Pont de Nemours & Co., Inc., has opened a new laboratory in Newburgh, N. Y., for research and development work in the field of coated fabrics and allied products. The three-story building of reinforced concrete contains the most modern equipment for the development and testing of coated fabrics and sheeting under all sorts of conditions. The new building is located on the property of the company's Newburgh plant which manufactures Fabrikoid pyroxylin coated fabrics, Fabrilite vinyl plastic resin coated fabrics, Tontine pyroxylin impregnated window shade fabric, and other impregnated fabrics and sheeting for many industrial uses. The laboratory contains equipment for the simulation of weather conditions, and includes administration offices, a library, and various office and work rooms. The laboratory is directed by R. E. Thomas, and is part of the Chemical Division of the company's Fabrics and Finishes Department.

### U. S. Shifts Trust Suit

The Government dropped its criminal complaint against the United Shoe Machinery Corp., charging violation of anti-trust laws, on July 7. Instead, a civil suit has been filed accusing the corporation of holding a monopoly on the shoe machinery business. A special Federal Grand Jury empaneled eighteen months ago to hear evidence on the criminal complaint was dismissed. James M. Malloy, acting chief of the Department of Justice's Boston, Mass., office, said the Government felt the civil suit would "bring more affirmative relief." The suit seeks to force the United Shoe Machinery Corp. to sell some of its properties and to make patents available to others. A fall trial is sought.

### Chase Appointed Sales Manager

Donald C. Chase

Donald C. Chase has been appointed manager of rubber and plastics machinery sales for the Farrel-Birmingham Co., Inc., Ansonia, Conn. Mr. Chase has been with Farrel-Birmingham since 1940, and has had wide experience in the design and operation of extruding machines as well as other types of rubber and plastics processing machinery. Prior to his present position, he was assistant manager of the rubber and plastics machinery sales division. Mr. Chase was previously employed with the Kelly-Springfield Tire Co., where he worked in various engineering and managerial capacities for several years following his graduation from the Massachusetts Institute of Technology in 1926. Simultaneous with his promotion, Mr. Chase was sent abroad to make a survey of customer relations and equipment developments in England and several European countries.

### Esso Tervan 2800

Esso Standard Oil Co., 15 West 51st St., New York 19, N. Y., has announced production of Tervan 2800, a blend of refined paraffin wax and high molecular weight Vistanex (polyisobutylene). The product is odorless, tasteless, and colorless when blended with crystalline wax, in any of a wide range of ratios, and is said to impart better qualities of viscosity, adhesion, water and water-vapor impermeability, etc. Tervan 2800 is inhibited against oxidation and replaces three former products, Tervan 349, 449 and 3315. Tervan 2800 finds application in the paper coating industry, in textile sizing and surfacing, in buffing compounds and in other industrial uses.

Goodyear has announced that its line of sanitary hose is available again in a white, oil-resisting synthetic cover, especially compounded for long wear in abrasive usage. Discontinued during the war due to a shortage of compounding materials, the hose is used for general washout or cleaning service in packing plants, creameries, dairies, etc.

### Santicizer 141 Plasticizer

Monsanto Chemical Co. has introduced a new vinyl plasticizer of the phosphate type known as Santicizer 141. The product is specifically designed as a primary plasticizer for polyvinyl chloride and polyvinyl acetate film, sheet or molded articles. Santicizer 141 is said to be compatible with a wide variety of resins, in addition to polyvinyl chloride. These include cellulose nitrate, cellulose acetate-butyrate, ethyl cellulose, polymethyl methacrylate, polystyrene and polyvinyl butyral resins. Santicizer 141 possesses low volatility and imparts good low-temperature flexibility, solvent resistance and flame retardance. Preliminary laboratory test data indicate that it is free of any systemic toxicity and is non-irritating to human beings. Santicizer 141 finds application in free film, coated textiles, shoe soles, baby pants, hospital sheeting and other uses. Monsanto plans to increase production of the plasticizer to approximately ten million pounds per year.

### Polyethylene Sheet for Backing

A special polyethylene sheet has been developed and is being manufactured by the Cadillac Plastic Co., 651 West Baltimore, Detroit 2, Mich., for rubber backing problems of all kinds, including tire repair materials, friction tape, new tires, and sundry materials. The polyethylene sheet has a unique wax-like texture and is said to be resistant to water, acids and alcohol. Polyethylene produces a high surface gloss, will not flake or tear, is seamless and of uniform caliper. It is also said to be tough, chemically inert, and heat-sealable. The Plax polyethylene sheet made by the company has a tensile strength of 1700-1900 psi, flexural strength of 1500-1700 psi, Rockwell hardness of R-25 to R-35, and elongation of 50-600%. It has a specific gravity of .92 and a specific volume of 30.1 cu. in./lb., and shows no discoloration in sunlight. It is available in various standard gauges.

### MW Pliofilm For Margarine

The General Products Division of the Goodyear Tire & Rubber Co., has developed a new type of Pliofilm, MW Pliofilm, designed specifically for use in packaging margarine. MW Pliofilm is being marketed as a companion product of other types of Pliofilm used for protective packaging. Company officials stated that within the next few months increased production facilities for Pliofilm will be in operation.

### Italian Agency Seeks Lines

The old established firm of Ditta G. E. Hess, 1 Via Montecuccoli, Torino, 103, Italy, is interested in hearing from American manufacturers of rubber accelerators, antioxidants, colors, fillers, etc., who wish representation in Italy. The firm now handles a line of carbon blacks as a sub-agent of Chance & Hunt, Ltd., and is regularly calling on rubber manufacturers in Italy. Interested manufacturers should write direct to the company.

# TALES WORTH RETELLING

(No. 6 of a series)

## THE TWO FROGS

TWO FROGS dwelled in the same pool. The hot summer came and dried it up, so that they were forced to sally forth to look for other water.

After a hot and dusty search, the Frogs, parched and weary, chanced to find a deep well full of cool water.

"Let us jump in here!" cried one.

"Wait a bit," counselled the other; "if this were to dry up, how could we ever get out again?"

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# LOS ANGELES NEWS

As briefly reported last month, the Technical Session of the June meeting of the Los Angeles Rubber Group consisted of a panel discussion concerning mechanical rubber compounding problems. The panel of authors consisted of Adelbert Schade (Ohio Rubber), Andrew L. Matelik (Kirkhill Rubber), Fred Woerner (Reeves Rubber), Raymond B. Stringfield (Fullerton Mfg.), B. R. Snyder (Vanderbilt). The discussion was moderated by George W. Miller (Voit Rubber), chairman of the technical group. The questions submitted to the panel, along with their discussions, follow:

**1. At what price does reclaim become uneconomical as compared with GR-S and/or natural rubber in a low-priced mechanical?**

Mr. Schade presented a formula for calculating this economic balance which is as follows:

$$\frac{\text{Pound cost} \times \text{Sp. Gr.}}{\%\ \text{Rubber Hydrocarbon}} = \text{Equivalent rubber cost}$$

A whole tire reclaim at 8c — Sp. Gr. 1.20 — and Rubber Hydrocarbon 52% = 18½c equivalent rubber price. So when rubber or GR-S is 18½c or under, it becomes a question as to whether reclaim is economical. Of course, in some jobs, reclaim will always be used to help processing and other conditions.

**2. What is the cause of reversion in rubber stocks?**

Reversion in rubber stocks might be explained as a depolymerization defect which can be caused by heating in the absence of air, according to Mr. Stringfield. A compound containing a low sulfur content or one cured with ultra accelerators is more apt to be subject to this defect. With ultra accelerators it is important to obtain the optimum cure to stay away from this trouble. Mr. Snyder confirmed the statement that ½ to 1% tellurium materially aids the prevention of reversion. Selenium is also helpful in this regard, but is not as effective as tellurium.

**3. How would you compound a natural rubber, nearly a pure gum stock, so that it calenders consistently free of blisters with 75% of each run going back as trim in subsequent calender runs?**

The necessity of using 75% trim was in general questioned by the panel. Mr. Stringfield, however, outlined the fundamentals of keeping away from blisters in calendering by saying that this problem was as much one of processing as compounding. In this regard, the stock should be used as stiff as possible for calendering so that it will not be overly soft for later operations. Hot calendering should help in this regard. The addition of a high styrene copolymer such as pliolite should be of some help.

**4. What accelerator would you recommend for an open-steam cured GR-S stock which was heavily compounded with carbon black and clay to give a required hardness of 80 shore?**

Mercaptobenzothiazole was recommended by Mr. Snyder as the preferable accelerator under the conditions outlined.

**5. How important is dispersion in mechanical rubber product service?**

Proper dispersion of the various compounding ingredients was stated by Mr. Woerner to be highly important if a high quality product is to be obtained. It is particularly important to completely disperse small quantities of critical ingredients such as accelerators. In this regard, the benefit of master batching was pointed out. In order to obtain a uniform stock, there are four main steps, all of which are exceedingly important. First is the selection of the type of pigment to be used; second, the amount of pigments; third, the order of incorporation, and fourth, the method of mixing. Each of these features must be given careful consideration and properly handled if a high quality product is to be obtained.

**6. What percentage shrinkage should be designed into normal molds?**

As a rough rule of thumb, a shrinkage of 3/16 inch per lineal foot can be used, according to Mr. Matelik. Wherever a close tolerance is specified for a finished product, however, it is desirable to measure the shrinkage of the particular stock involved. This is easily accomplished by curing a piece in a standard shrinkage mold, using dimensions 2 x 2 x 12 inches. Highly loaded stocks will have less shrinkage than light loadings, and in general, synthetic stocks shrink more than natural.

**7. How can you bond neoprene to hard rubber?**

The problem presented here was that of putting a neoprene tread on a hard rubber caster wheel. According to Mr. Schade, the first item of importance here is to have fresh clean stocks. The bond is further enhanced by using a high percentage of a tackifing softener such as pine tar. Tie gum high in softener might also be of some help. Extruding the neoprene stock over the hard rubber stock while hard rubber stock is fresh will generally give favorable results.

**8. What type of polymer is best suited for production of soling compounds?**

For a cheap sole regular GR-S is recommended. For a high quality product a butadiene styrene copolymer with a high styrene content is preferable. A number of these are currently on the market under various trade names.

**9. What would be your recommendations for a low temperature service compound which would be resistant to both aromatic and aliphatic fuels?**

The problem presented here was that of making airplane gasoline tank fittings which would be resistant to the aromatic fuels commonly encountered in the U. S., and also aliphatic fuels normally obtained in other parts of the world. The panel agreed that this was a difficult problem for which none of them had an immediate answer.

## Future Division Meetings

As previously reported, the Fall Meeting of the Division of Rubber Chemistry, A.C.S., will be held in Detroit, Mich., on November 8 to 10, 1948. Dr. C. W. Selheimer, of the U. S. Rubber Co., has been appointed chairman of the Local Arrangements Committee. Abstracts of papers planned for presentation at this meeting should be in the hands of the Division secretary by September 15. The Spring Meeting next year will be held in Boston, Mass., and Jim Walton, of the Boston Woven Hose & Rubber Co., has been named chairman of the Local Arrangements Committee for that meeting, which will probably be held during the third week of May, 1949.

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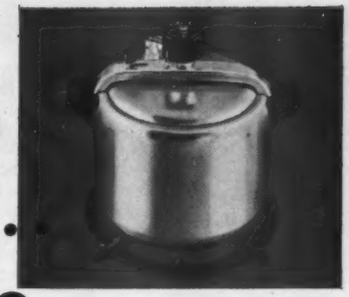
Addition of four new sizes of red bicycle tubes to its line has been announced by Goodyear. One of the new sizes—26 x 2.125 — contains extra rubber under the tread to provide greater protection.

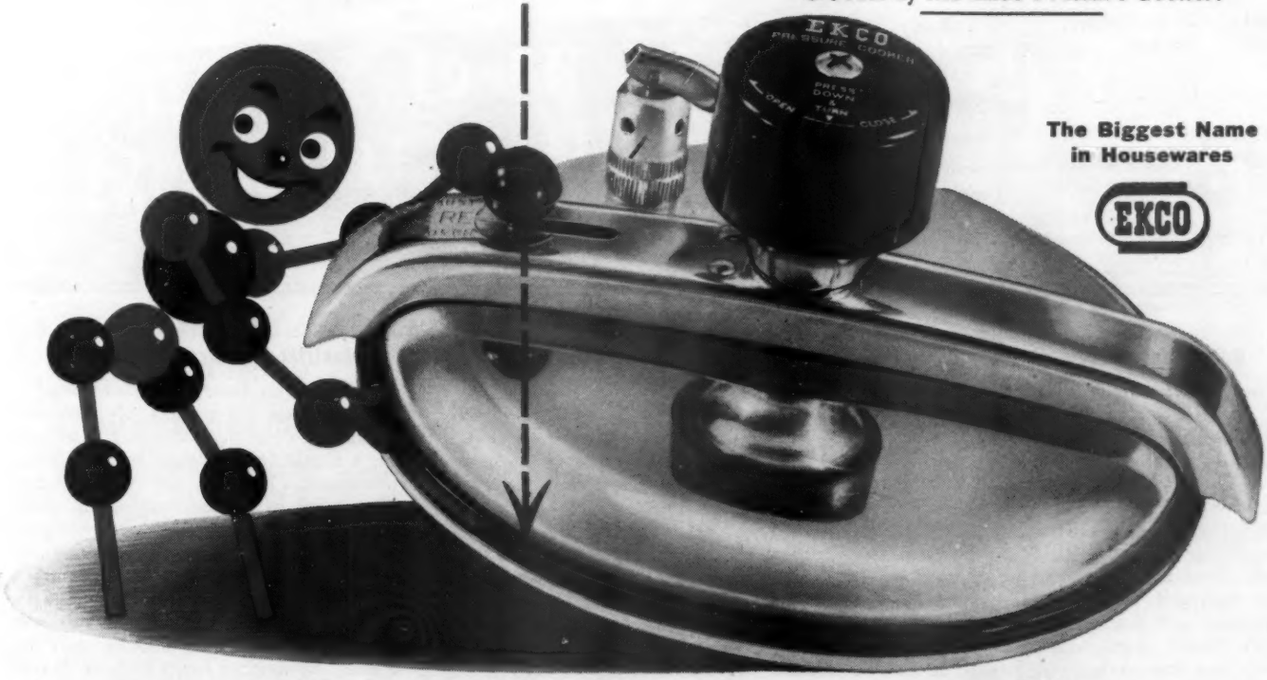
*Panel at the Technical Meeting of the Los Angeles Rubber Group held on June 1, 1948. Left to Right, Back Row: Fred Woerner (Reeves Rubber); B. R. Snyder (Vanderbilt); Front Row: G. W. Miller (Voit Rubber); Ray B. Stringfield (Fullerton Mfg.); A. Schade (Ohio Rubber); A. L. Matelik (Kirkhill Rubber).*

# When "the heat's on"... pressure, too, this PERBUNAN gasket can take it!



When deciding on a material for the gasket of their famous pressure cooker, the Ekco Products Company chose a *Perbunan* composition because it:

1. *Does not swell, soften or lose its shape under pressure at 250° F. even when exposed to most vegetable and animal fats and oils.*
2. *Does not harden or become brittle in use or when exposed to air.*
3. *Has no taste or odor, even when boiled in water for long periods of time; not harmed by washing in hot, soapy water.*
4. *Has good physical properties such as: (a) high tear resistance, (b) good tensile strength, (c) good elongation.*
5. *Materially reduced the manufacturing cost of the* EKCO *Pressure Cooker.*




**The Biggest Name in Housewares**

EKCO

Other manufacturers are finding new uses for versatile *Perbunan* every day. They like its toughness and the way it stands up under severe heat, cold and a wide variety of oils, acids, and greases . . . and they like its ready adaptability to the many complex molded shapes of resilient engineering materials.

NEW FEATURE: *Perbunan*'s new stabilizer permits the use of a wide variety of delicate shades that retain their original color.

Maybe there's a place in your business where the use of versatile *Perbunan* in a plastics or rubber part may save you plenty . . . both in initial cost and replacements. We will be glad to give you all the information you need.

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**PERBUNAN**

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**THE RUBBER THAT RESISTS AIR, WATER, HEAT, COLD AND TIME**

## NEW POLYMERS AUTHORIZED BY OFFICE OF RUBBER RESERVE, RECONSTRUCTION FINANCE CORPORATION

Listed below are types and properties of new experimental GR-S polymers (including GR-S latices) which have been authorized by the Office of Rubber Reserve, Reconstruction Finance Corporation, since publication of those in our previous issue. Procedures for the distribution and sale of these polymers will be found in our October, 1945, issue. Normally, experimental polymers will be produced only at the request of the consumers and 20 bales (one bale weighs approximately 75 pounds) of the original run will be set aside if possible for distribution to other interested companies for their evaluation. The 20 bales when available will be distributed in quantities of one or two bales upon request to the Sales Division of Rubber Reserve or will be held for six months after the experimental polymer was produced unless otherwise consigned before that time. Subsequent production runs will be made if sufficient requests are received to warrant them.

| *X Number* | *Manufacturing Plant* | *Date of Authorization* | *Polymer Description* | *Special Characteristics* |
|---|---|---|---|---|
| X-461 GR-S | U. S. Rubber, Naugatuck | ..... | Similar to X-181 GR-S except that the conversion is slightly lower. Normal butadiene-styrene ratio. 105 Mooney. | Slightly lower conversion expected to improve solubility characteristics and processing. Also similar to GR-S-85 except for lower conversion. Should show advantages over both X-181 and GR-S-85. |
| X-462 GR-S | U. S. Rubber, Borger | 5-28-48 | A GR-S black masterbatch containing 60 parts of HAF black per 100 parts of GR-S (X-432) made at lower reaction temperatures (41° F.) with cumene hydroperoxide activated recipe. | |
| X-463 GR-S | U. S. Rubber, Borger | 5-24-48 | Standard GR-S monomer charge ratio polymer in an activated recipe, emulsified with special fatty acid soap. Reaction Temperature: 14° F., 55-65 Mooney, 1.25% BLE. Salt acid coagulation. | |
| X-464 GR-S | U. S. Rubber, Borger | 5-24-48 | Standard GR-S monomer charge ratio polymer in an activated recipe, emulsified with special fatty acid soap. Reaction temperature: 0° F., 55-65 Mooney, 1.25% BLE. Glue acid coagulation. | |
| X-465 GR-S | U. S. Rubber, Borger | 5-28-48 | A GR-S black masterbatch containing 50 parts of HAF black per 100 parts of GR-S (X-432) made at lower reaction temperatures (41° F.) with cumene hydroperoxide activated recipe. | |

### Builds New Fabricating Plant

The Mixing Equipment Co. of Rochester, N. Y., has recently installed its entire manufacturing operation into a modern new plant located in the outskirts of the city. The new plant is a one-story structure designed for maximum efficiency in material flow, fabrication and assembly. The plant is equipped with two large truck docks and a railway siding, and is fully equipped with the latest machines, equipment and machine tools. The company's former plant will be used for research and engineering. A pioneer in the field of agitation development, the company plans to place even more emphasis on this phase of its operations.

### Auburn Expands Activities

The Auburn Rubber Corp., Auburn, Ind., has decided to expand its facilities for the manufacture of mechanical rubber goods. William T. Exton has joined Auburn's staff in direct charge of the Mechanical Rubber Division. Company officials stated that the decision to expand facilities was reached in consideration of the company's geographical location, and the fact that plants at Auburn, and Connellsville, Penna., will enable it to serve mechanical rubber goods users adequately. Auburn has been manufacturing rubber products since 1910.

### Index to ASTM Standards

The American Society For Testing Materials has published the "Index To ASTM Standards," as of December, 1947. The publication is an adjunct to the large 1946 "Book of Standards" and the 1947 Supplements and enables any of the approximately 1500 standard specifications and tests in the volumes to be located readily. The Index is also of service to those who wish to determine whether ASTM has issued standard specifications, test methods, or definitions covering a particular engineering material or subject. Copies of the 240-page publication are furnished without charge on written request to ASTM headquarters, 1916 Race St., Philadelphia 3, Penna.

### Appointed French Representative

Frederick L. Graham has been appointed representative in Paris for the sale in France of carbon black and pine distillates for Godfrey L. Cabot, Inc., Boston, Mass. Mr. Graham graduated from Princeton University in 1937, and has spent many years in France and in French North Africa. During the last war he served as liaison officer with the rank of Lieutenant Colonel in the French First Army, and was awarded the French Croix de Guerre, with palm. He succeeds V. Paschal, who died recently.

### Industrial Mobilization Booklet

The Munitions Board has just issued a new booklet on the subject of industrial mobilization. Entitled "Military Procurement, a Guide for Joint Industry-Military Procurement Planning," the volume is not available for mass distribution, but individual copies can be obtained by direct request to the Facilities Division, Munitions Board, Washington, D. C. Another booklet recently published of interest to manufacturers is "How to Do Business with the Navy." This booklet may be procured by writing to: Chief of Naval Material, Room 2212 Main Navy Building, Washington 25, D. C. (Attention: C. M. Strosnider.)

### Elastron Multi-Color Tapes

Industrial Synthetic Corp., of Garfield, N. J., has announced a new technical achievement in the extrusion of their Elastron compounds in multi-color tapes and shapes. While extrusion of multi-colors adjacent to one another has been produced in the past, the company believes that they are the first to extrude a solid color on one side and a second solid color on the opposite side of a shape or tape. At present, Industrial Synthetics is producing a two-color tape in ¾-inch and 1-inch widths in a large variety of color combinations.

# NOW a Champion Clay INNOVATION!

## IT'S PACKED ON EXPENDABLE PALLETS

1. **Cuts Unloading Costs and Time . . .**
2. **Simplifies Subsequent Handling . . .**
3. **Minimizes Bag Breakage . . .**
4. **Reduces Inventory Counts . . .**
5. **Enables Use of Standard Fork Truck Equipment . . .**

CHAMPION—that extra fine, hard, rubber-compounding clay can now be shipped on EXPENDABLE PALLETS for speeding up handling and preventing bag breakage . . . Truly an innovation in clay packing, CHAMPION is first to bring the benefits of this development to you with fine, uniform light-colored clays that are mined and processed with extra care by the National Kaolin Products Company, at Aiken, South Carolina.

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# NEW RUBBER GOODS

### Elasto-Rib Vibration Control

The Korfund Co., Inc., 48-15 32nd Place, Long Island City 1, N. Y., has announced the production of new and improved Elasto-Rib, a laminated rubber-cork material for low cost, effective vibration and noise control. Elasto-Rib is composed of

a layer of cork bonded between two layers of deep-grooved, oil resistant synthetic rubber. The ribbed contour of the rubber is said to increase the isolation properties by providing greater deflection and forms a non-skid contact with the floor, frequently eliminating the need for bolting machines to the floor. The product is now available in one inch thick sheets up to 24 inches by 36 inches in size. Recommended loading for Elasto-Rib is between 7 and 21 pounds per square inch.

### New Use For Conductive Rubber

U. S. Rubber Co. is now producing an electric heater for refrigerators, the heater being a strip of electrically conductive rubber which warms up to about 115° F. and prevents "sweat" or moisture from condensing on certain parts of the cabinet's exterior. The strip is placed between the freezing compartment and the regular cold chamber of the refrigerator. The heat keeps the dividing member or "mullion" free of moisture without materially affecting the temperature of the refrigerator. Electrically conductive rubber, a development of U. S. Rubber, is a resistance element without wires. The rubber becomes warm when energized by electricity and throws out a steady flow of heat at low temperature.

### Pulpwood Saw V-Belt

The Mechanical Goods Division of the Goodyear Tire & Rubber Co., has developed a new V-belt, designed especially for portable power saws used in pulpwood felling operations and in clearing underbrush. Called the Pulpwood Saw V-belt, the new product has been tested by manufacturers and users of power saws, and it is claimed that results indicate an operating lift up to 100% longer than conventional belts. The V-belt is sinewed with the highest tensile rayon cord, and equipped with an improved wear-resisting envelope. The high tension load carrying members are designed to withstand severe friction heat and shock.

### Nursery Rhyme Latex Toys

Among the numerous latex toy novelties featured by the Eastern Rubber Specialties Co., South Norwalk, Conn., are the Nursery Rhyme models created for the company by Eunice Cochran, two of which, the Cat-N-Fiddle and Old King

Cole, are illustrated herewith. Like other toys made by the company, these models are harmless, lightweight novelties, with painted eyes and decorations. They are of hollow construction and may be washed with cold water and soap. Each of the Nursery Rhyme models is equipped with a rustproof whistle which sounds at the slightest touch. Each is sanitary packed in a cellophane wrapper. These models are 7 inches high.

### U. S. Innacush Solid Tire

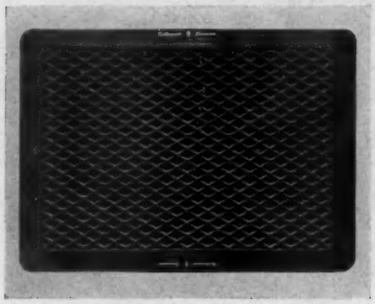
The U. S. Rubber Co. is now producing an industrial solid tire designed to lessen driver fatigue and reduce vehicle maintenance cost. Known as the U. S. Innacush, the tire has a soft inner construction to provide greater cushioning effect on powered industrial trucks. Its development was prompted by the need for a tire with vibration absorbing characteristics comparable to pneumatic plus the high load capacity and trouble-free performance of solids. The tire is now being produced in 17 popular sizes and has been adopted as original equipment by a number of manufacturers of industrial trucks and tractors.

### Rayon Cord Bicycle Tire

Firestone Tire & Rubber Co. has introduced what is said to be the first rayon cord bicycle tire. The white sidewall tire which utilizes rayon instead of conventional fabrics is said to incorporate the advantages of greater strength and cooler-running provided by rayon cord fabric. Tests of the rayon tire by Firestone engineers reveal that the tire has twice the strength to resist impacts and bruises and double the mileage life of bicycle tires made with conventional fabrics.

### Correction and Apology

One of those peculiar make-up errors which occur from time to time despite the most careful precautions occurred in our last issue when the illustration of the Rubbermaid Kar-Rug, made by the Wooster



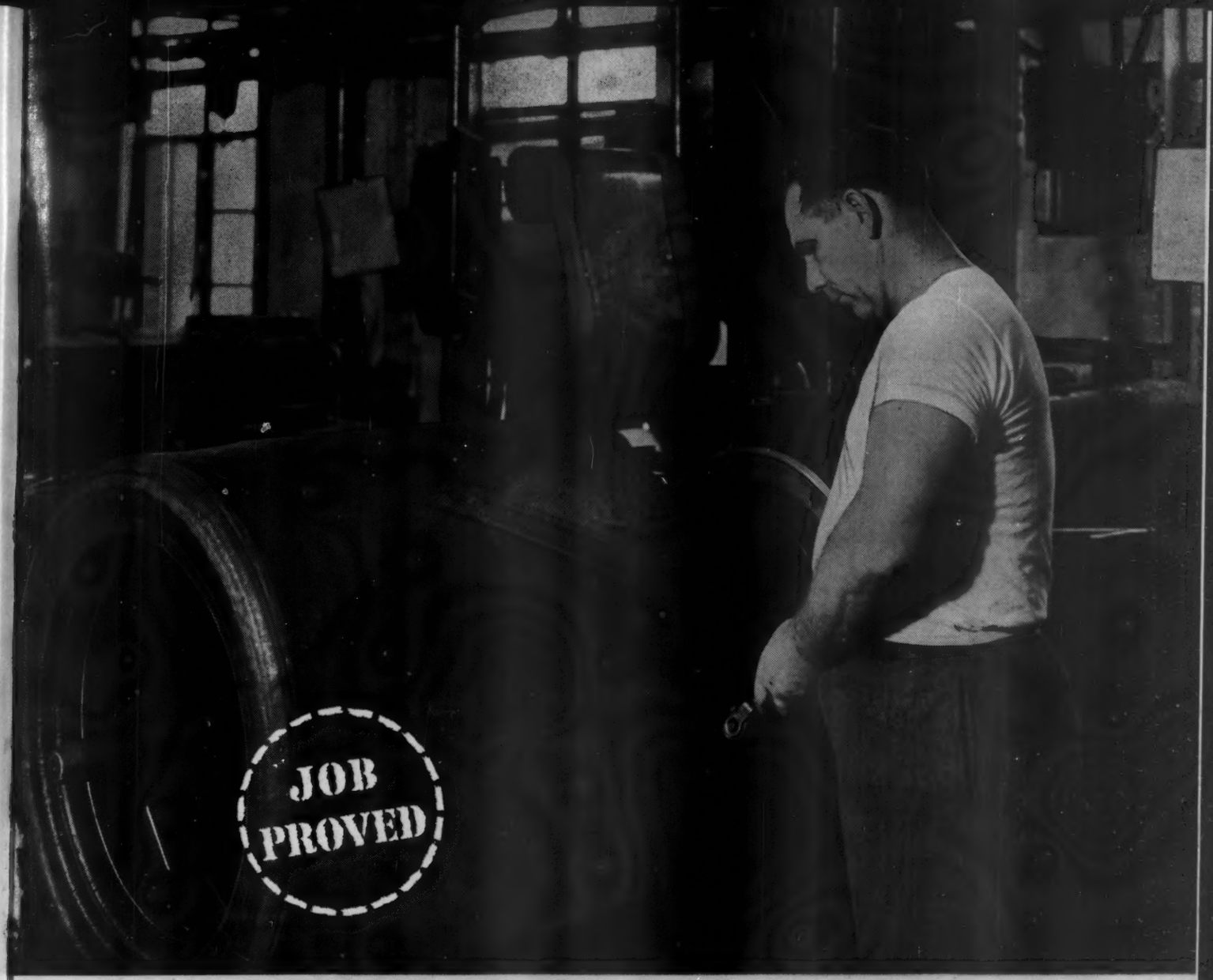
*Wooster Rubbermaid Kar-Rug*

Rubber Co., of Wooster, Ohio, was transposed with that of the Sav-A-Mat car floor mat, a product of the Stello Products Co., Hutchinson, Kansas. We are reproducing both illustrations herewith, correctly identified as to proper manufacturer. The Wooster Rubbermaid Kar-Rug comes

*Stello Sav-A-Mat*

in three different sizes, engineered to fit the front and rear of any car. Made of a new rubber compound, these rugs are available in five separate colors to match or harmonize the brilliant interiors, upholstering and seat covers which feature today's automobiles. The Stello Sav-A-Mat is made of a specially compounded rubber for long lasting qualities. Construction of the bottom side prevents slipping while a ribbed design on the top surface catches and hold dirt.

A new rug with a built-in non-skid back has been developed by Wollner-Clist, Inc., New York City, which combines a new cotton weave with a new idea in home safety. The rug is "deskidded" at the factory by applying U. S. Rubber's Rugback, while the new weave, called "popcorn," has bunches of tufts which give an embossed effect.




# SAVING $4,800 A YEAR WITH CIRCOSOL-2XH

## Sun Rubber-Processing Aid Eliminates Extra Cementing Operation in Tire Plant

A manufacturer was using a mixture of 50 percent GR-S and 50 percent natural rubber for automobile, truck, and airplane tires. Pine oil and an ordinary type of processing oil were being added as plasticizers. This combination of oils affected the tack of the stock to such an extent that the various plies had to be cemented together in building up the carcass. Sheets often wrinkled in processing and had to be discarded.

A Sun Engineer was consulted. After studying the operation, he recommended Circosol-2XH—a rubber-processing aid developed by Sun for use with GR-S.

Following the introduction of Circosol-2XH the tack induced by processing was not destroyed, and the cementing operations were no longer necessary. Sheets no longer wrinkled. Waste was reduced. Savings in labor alone amounted to some $400 a month.

There's a "Job Proved" Sun product for every modern rubber-processing need. If you're having trouble with natural, reclaim, or synthetic rubbers, your Sun Engineer can help you. For complete information, just call your nearest Sun Office.

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SUNOCO

# CANADIAN NEWS

Because increasing supplies of natural rubber drove down its sales prices, Polymer Corporation, the government-owned synthetic rubber plant at Sarnia, made a net profit of only $25,623 during the 12 months ended last March 31st.

The company was set up during the war when Japanese domination of the Pacific practically cut off crude rubber supplies. During those years it built up a surplus account which with this year's $25,623 now totals $3,633,095. Out of this surplus, however, $250,000 was taken this year for an inventory reserve. Had the firm been obliged to pay the taxes to which private concerns are subjected it would probably have shown a loss on the year.

Exchange difficulties interfered with the company's sales to Western Europe. J. E. Brunning, president of the corporation, stated in the report that had interested European firms been able to obtain import permits from their governments to buy Polymer products freely, the corporation might well have been hard pressed to meet their requirements.

Late in 1947, Mr. Brunning said, Reconstruction Finance Co., a U. S. Government-owned corporation, agreed to buy all Polymer's exportable surplus to March 31, 1948. Under this contract, Polymer sold to the United States 11,784,845 pounds of GR-S and 95,495 pounds of Butyl.

As crude rubber was readily available at low prices, consumption of both GR-S and Butyl fell off during the year. To promote sales, the firm launched a program of diversification among synthetic rubber by-products. A contract was made to supply ethylene to the Dow Chemical Company.

Capital expenditures during the year totalled $2,007,473, most of which went on the ethylene plant. Mr. Brunning warned that further substantial capital expenditures would be required to permit large-scale production of nitrate rubbers and the new low temperature GR-S.

Mr. Brunning believed a substantial export business to the United States would be developed. "The directors feel that the fact that substantial quantities of synthetic rubbers were marketed during the past year despite the competition of crude rubber augurs well for the future of the project," he wrote.

Government advances to the project to date total $42,886,297. The financial statement showed assets of $49,003,939 of which plant and other fixed assets were given a depreciation value of $38,114,562.

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Reconstruction Minister Howe recently stated in the Canadian House of Commons that synthetic rubber from the Polymer Corporation, will be able to compete with natural rubber on the markets of the world.

He told questioners that last year was the corporation's worst year. Natural rubber slipped to 14 cents a pound and Polymer had to reduce the price of its product to about 15 cents a pound, which gave only a narrow margin of profit.

Later, however, natural rubber advanced to 20 to 22 cents a pound and Polymer brought its price up to 18 to 19 cents.

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Stocks of natural, synthetic and reclaim rubber at the end of April were lower than on the same date last year, the Bureau of Statistics reports.

Month-end stocks of natural rubber amounted to 5,833 long tons, compared with 7,187 tons for April, 1947; synthetic rubber 4,074 tons compared with 5,473 tons, and reclaim 2,181 tons compared with 2,931 tons.

Domestic production of synthetic rubber in April decreased almost 40 per cent to 2,787 tons from 4,628 tons last year, while 391 tons of reclaim rubber were produced against 360 tons last year.

Domestic consumption of natural rubber in April rose almost 50 per cent to 3,694 tons against 2,476 tons used last year, while consumption of synthetic rubber declined to 1,865 tons from 2,942 a year ago, and reclaim rubber to 1,172 from 1,395 tons.

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Government officials at Ottawa are understood to be nearing completion of an inquiry into the Canadian rubber industry under the Combines Investigation Act. When they complete their report, they will forward it to Justice Minister Ilsley who is required by law to publish it within 15 days.

The law provides that necessary prosecutions will be launched by the Attorney-General of Canada or the attorneys-general of the provinces. Prosecutions are based on charges of participating in combines in restraint of trade and against the public interest.

F. A. McGregor, commissioner under the act, told the Prices Committee in February that a rubber inquiry was being held. He said it covered the tire, footwear and clothing branches of the rubber industry. No announcements are made, however, as to the progress of such inquiries.

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Net earnings of $132,368, equal to $1.12 a share on common, are reported by the Viceroy Manufacturing Co., for the year ended February 28, compared with $80,231, or 68c a share, for the previous year. Profit from operations after depreciation was increased to $201,621 from $143,071 a year ago. Earned surplus, after payment of $46,095 in dividends, totalled $552,403. Working capital of $722,447 compares with $739,260 last year. Current assets of $999,326 included inventories of $568,054. Current liabilities totalled $276,879.

**Southwell Heads Canadian Sales**

**R. J. Southwell**

R. J. Southwell, formerly technical representative for the Bakelite Corp., unit of Union Carbide and Carbon Corp., has been appointed sales manager of Canadian Resins and Chemicals, Ltd., another unit of the parent organization. Mr. Southwell had been associated with Union Carbide's Plastic Group for the past thirteen years in sales engineering work for Vinylite resins and plastics.

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Settlement between Local 80 of the United Rubber Workers (CIO) and the tire plant of the Dominion Rubber Co. at Kitchener, Ont., in the current rubber industry wage raise drive, was announced recently. The local union said the settlement figure was 10 cents an hour across the board to all hourly paid production workers. About 1,300 employes benefit. The wage increases are retroactive to April 12th.

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Sidney L. White has been named vice-president and general manager of A. G. Spalding & Bros. of Canada, Ltd., Brantford, Ont., succeeding the late Reginald V. Woffindin. David W. Whyte has been named factory manager in charge of all manufacturing operations and Herbert O'Leary manager in charge of sales, advertising and promotion.

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According to a preliminary statement issued by the Dominion Bureau of Statistics, chemicals and allied products produced in Canada in 1947 were valued at $448,000,000, compared with $376,000,000 in 1946, a 19% increase. The increase in value was chiefly due to advanced prices, the report indicates, the actual volume increase amounting only to some 6%. The index for employment in the chemicals and allied industries was up only 2% from 1946, but the index of wholesale prices advanced 18%. Value of exports in 1947 was $83,800,000, an increase of 24% over 1946.

# DUREZ Phenolic Resin... fits rubber for rugged life

**THESE EVINRUDE** Sportwin motor control knobs and handles suggest why rubber manufacturers use Durez phenolic resins for hard and semi-hard stocks. For your ease in ticking them off, we've listed *all* the advantages at the right. Many of them can lead to improved production techniques in your plant. Many of them help to make products sell easier and serve better. Rubber manufacturers are invited to send for free samples and the study, "Durez Resins in the Rubber Industry." Write to Durez Plastics and Chemicals, Inc., 317 Walck Road, North Tonawanda, N. Y.

## 12-WAY IMPROVEMENT FROM ONE INGREDIENT

- Improve mixing...by plasticizing and reducing nerve.
- Carry extra loading...by its fluidity when hot.
- Improve molding...by becoming plastic and then hardening.
- Reduce vulcanizing time...by its fast cure and vulcanizing effect.
- Increase hardness...by setting hard in itself.
- Increase stiffness...by its natural cured rigidity.
- Reinforce...by increasing tensile strength.
- Improve wear...by improving abrasion resistance.
- Resist higher temperatures...by its natural heat resistance.
- Improve chemical resistance...by its inherent solvent and chemical resistance.
- Produce glossy finish...by its natural high gloss.
- Improve weather resistance...by its resistance to water and oxidation.

DUREZ

PHENOLIC RESINS

MOLDING COMPOUNDS

INDUSTRIAL RESINS

PROTECTIVE COATING RESINS

**PHENOLIC RESINS THAT FIT THE JOB**

# OBITUARIES

## *Donald F. Cranor*

Donald F. Cranor, technical director of the Binney & Smith Co., New York, and associated with that firm since 1923, died in Paris, France, on Saturday, July 3, as the result of a cerebral hemorrhage. Mr. Cranor attended the Second Rubber Technology Conference in London in late

June, where he delivered a paper on "The Compounding Significance of Carbon Surface, Structure, and pH," and went to Paris following the Conference. He was 58 years of age.

Born in Wilmington, Delaware, on February 20, 1890, Mr. Cranor attended the University of Pennsylvania, graduating with the class of 1912. Immediately after graduating, he joined the Lee Rubber & Tire Co. in Conshohocken, Penna., as a member of the technical staff, and served as chief chemist from 1912 to 1918, assistant superintendent from 1918 to 1923, and technical superintendent of both Lee and its affiliate, the Republic Rubber Co., in the latter year. In late 1923 he joined Binney & Smith.

Shortly after joining the Binney & Smith organization, Mr. Cranor set up the first research and development laboratory in the carbon black industry. This department expanded under his direction and a large staff was organized for technical service to the rubber, paint and allied industries. In the ensuing years "Don," as he preferred to be called, became widely known throughout the rubber industry for his knowledge of carbon black and its application to rubber.

Rarely was a technical rubber meeting of any importance held that did not feature a paper prepared or instigated by Don Cranor. Some of his published work covered data on the effect of organic accelerators on the vulcanization coefficient, the effect of pigments on the temperature of tires during service, the actual temperature of tires during vulcanization, and a technical comparison of rubber reinforcing materials.

Mr. Cranor was a long-term member of the American Chemical Society and a member of the 25-Year Club of its Rubber Division. He was also a member of the American Society for Testing Materials and the Society of Chemical Industry. He made his home at Port Washington, L. I., N. Y. A widow and son survive.

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## *G. Ray Powell*

G. Ray Powell, western divisional manager for the U. S. Tires Division of the U. S. Rubber Co., died on June 15 at St. Vincent's Hospital in Los Angeles, Calif. He was 54 years old. A native of Crisfield, Md., Mr. Powell joined the company in 1929 as a salesman in Baltimore, Md. In 1935 he was made assistant district manager at Philadelphia, Penna., and two years later was appointed district manager there. In 1942 he was appointed southern divisional sales manager with headquarters in Philadelphia, and in 1943 was transferred to Baltimore in a similar capacity. Two years later he was moved to Atlanta, Ga., where he remained until February of this year when he was appointed western divisional manager at Los Angeles. Burial was held in Baltimore on June 19. He is survived by his wife and daughter.

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## *John C. Gibson*

John C. Gibson, chairman of the board, and formerly president of the Pioneer Rubber Co., Willard, Ohio, died at his home in Willard on June 24 after an illness of several months. Mr. Gibson was 67 years old at the time of his death. Born near Danville, Ky., he taught school for a time, and then went to work for the B. F. Goodrich Co. in Akron. In 1918 he helped organize the Pioneer Rubber Co. in Willard, becoming general manager of the concern. Services were held on June 26 in Grace Methodist Church in Willard. His wife, and a son, John H. Gibson, president of the company, survive.

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## *Henry W. Pease*

Henry W. Pease, founder of the Goshen Rubber & Manufacturing Co., Goshen, Ind., died recently of a heart attack at the age of 80. Mr. Pease had been associated with Goshen for 32 years, and although he had retired some years ago, played an active part on the Board of Directors of the company. Mr. Pease was a member of the Masons, and for many years had played a prominent role in Masonic affairs.

## *J. Herbert Coffey*

J. Herbert Coffey, managing director of the Seneffe Rubber Co. of Belgium, died recently at the age of 58 in the General Hospital at Toronto, Canada. He had returned to Toronto only a week before his death from a trip to Belgium, but had been in ill health for some time.

Mr. Coffey was formerly managing director of Gutta Percha Rubber, Ltd., of Toronto, joining that company as chief engineer in 1914. He became managing director of the Belgian concern about 1937. During the Second Great War he served as deputy inspector of gauges at Ottawa, and later general manager of Cuttings, Tools and Gauges, Toronto. In 1945 he returned to his position as managing director of the Seneffe Rubber Co. and made numerous visits to Belgium.

Born in England, Mr. Coffey was the son of the late J. H. Coffey, internationally known engineer and inventor in the rubber industry. He was a graduate of the Municipal School of Technology, Manchester, Eng., and Franklin Institute, Boston, Mass.

In charge of the drafting department of James C. Kay & Co. Ltd., Bury, Lancs., Eng., Mr. Coffey, in collaboration with his father, developed the design and construction of many types of engineering equipment for the rubber industry. He was a frequent lecturer on rubber industrial subjects.

---

## *Roy L. Albelt*

Roy L. Albelt, sales engineer for the Ohio Rubber Co., Willoughby, Ohio, died at his home in Cleveland, Ohio, on June 27. Mr. Albelt, who had spent 37 years in the rubber business, had been with Ohio Rubber since 1933. His connection with the rubber industry dated from 1911, when he entered the employ of the General Rubber Co. in Cleveland. He had been sales engineer for Ohio Rubber since the early war years. A native of Cleveland, Mr. Albelt was a member of Emmanuel Masonic Lodge, Covenant Chapter, Oriental Commandery, Lake Erie Consistory and Al Koran Shrine. He was also active in the Purchasing Agents Association of Cleveland. Surviving him are his wife and daughter.

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Issuance of a new technical data sheet giving detailed information on polyvinyl acetate copolymers in solution form for use in various applications has been announced by the American Polymer Corp., Peabody, Mass. These copolymers are water white, tough, flexible elastomers. Ask for Technical Data Sheet P-7.

---

U. S. Rubber has installed floor radiant heating in a new sand blasting building at its Fort Wayne, Ind., plant to solve the problems resulting from the accumulation of fine sand on heating elements and piping. The sand blasting operation is used at the plant to clean metal tanks before surfacing them with rubber.

The ever increasing popularity of Bratex Rubber Holland is due not to any one single virtue, but to the fact that it possesses ALL of the six desirable qualities pictured above. Hot cure, cold cure — for all types of processing Rubber Sheeting — *Bratex* fulfills every requirement — more than meets every test. Before or after vulcanizing, BRATEX peels off clean. It never sticks or flakes.

Available in two qualities, 20 and 40 inches wide, in 100 and 250 yard rolls. Special size rolls to order.

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...for the Rubber Industry

WITH ONE CONTROL UNIT
or the new "Package Type" Unit

Greater employee efficiency, lower maintenance costs and increased production can be yours with a properly engineered central dust collecting system. Nationally-known plants such as that of the large rubber processing concern shown above, select Parsons consistantly for all their dust problems. Each of these Oval Bag dust arrestors handle 40,000 cubic feet of air per minute continuously, without shut-down.

Parsons' dust collecting systems are the accepted standard for collecting carbon black, talc and all types of rubber dust.

*Introducing the new*
**Dust Control Unit**

For collecting dust from individual machines, or from a small group of points where dust is localized in a more concentrated area, the Parsons "GEM" Dust Collector (left) is recommended. This small, compact unit, designed for quick installation, has ample filter cloth to maintain uniform suction. It has proved it's effectiveness in many kinds of rubber plant operations and in scores of other industries.

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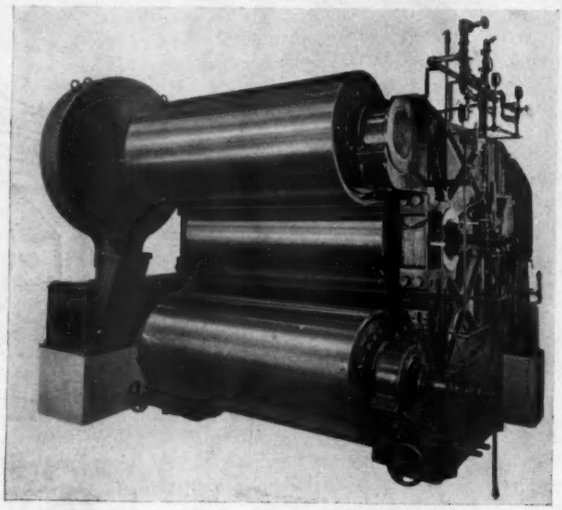
CREATIVE ENGINEERS MANUFACTURERS

Parsons ENGINEERING CORP.
2545 EAST 79th STREET, CLEVELAND, OHIO

# NEW EQUIPMENT

## Rotocure Continuous Vulcanizer

The Farrel-Birmingham Co., Inc., of Ansonia, Conn., has completed arrangements with the Boston Woven Hose & Rubber Co., of Cambridge, Mass., for the manufacture of the continuous vulcanizer known as the "Rotocure," patents on which are owned by Boston Woven Hose. Farrel-Birmingham has already built several of these machines for rubber and plastics manufacturers both in the United States and abroad. The

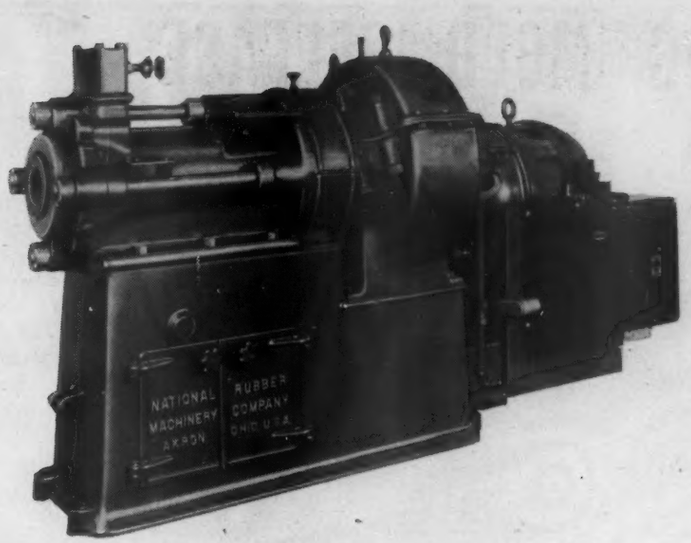


limitation of curing material in long lengths in hydraulic presses have long been recognized, and the Rotocure is said to be the first machine to overcome these disadvantages successfully.

Some of the products for which the Rotocure can be used are conveyor belting, transmission belting, floor matting (supported and unsupported), rubber flooring (sheet and tile), plastic flooring (sheet and tile), and plastic laminations. Advantages in the production of many other rubber and plastics products are also indicated.

The Rotocure method of continuous vulcanizing is said to offer the following advantages: (1) Continuous operation increases production by eliminating interruptions for opening, unloading, loading and closing. (2) Elimination of double cure and around the overlap area. (3) Avoidance of necking and non-uniform stretch. (4) Considerable reduction in the amount of floor spaced required. (5) Work area kept clean and free from water common in belt press pits, and (6) Lower production costs. On some products the Rotocure can save up to nearly 50% of the cost of producing an equivalent volume with vulcanizing presses.

The principle of operation of the Rotocure is relatively simple. The material to be cured is carried around an arc of the heated steel drum by a wide, high tensile, steel belt. The belt, which is tensioned by a back roll actuated by hydraulic cylinders, maintains a pressure on the material of approximately 60 to 65 p.s.i. Located around the circumference of the drum, and bearing




# 10 REASONS WHY your new National Tuber can CUT PRODUCTION COSTS!

NATIONAL Heavy Duty Tubing Machines are designed to solve *your* particular problems of production promptly.

Their performance, in terms of increased production, is another step forward in rubber processing techniques which advanced engineering makes possible.

National Heavy Duty Tubers are available in 8 different sizes ranging from 2″ to 12″ screw diameters, and smaller sizes for laboratory work.

Complete descriptive literature on NRM Tubing Equipment will be mailed upon request.

**1. CYLINDER HEADS** in all production sizes, available with adapters for water cooling.

**2. PYRO-HARDENED SCREWS** of selected forged steel insures maximum durability, minimum wear. Screw is held in perfect alignment in cylinder through use of rear extension thus reducing wear on screw and cylinder bushing.

**3. HEAVY CAST IRON CYLINDERS,** water jacketed, with removable spiral sleeve equipped with XALOY bushing.

**4. HOPPERS,** conveniently designed for manual or mechanical feeding.

**5. MANIFOLDS** are built in and equipped with four valves for heating or cooling cylinder as required.

**6. STRESS RODS** are extra heavy to insure perfect alignment of head and cylinder with gear housing. Precludes breakage.

**7. AIR GAP** opening between feed box end of cylinder and gear housing prevents heat transfer from cylinder and provides inspection of oil packing gland.

**8. THRUST BEARINGS** are anti-friction type and oversize throughout for added strength.

**9. DRIVE GEAR UNITS** consist of case hardened steel herringbone gears driven through a flexible coupling.

**10. MACHINE BASE** is of heavy cast iron and provided with doors for tool storage.

**NATIONAL RUBBER MACHINERY CO.**
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California Representative: Sam Kipp, P. O. Box 441, Pasadena 18, Calif.

*Creative Engineering*

# DC MOLD RELEASE FLUID

## now costs 9% less!

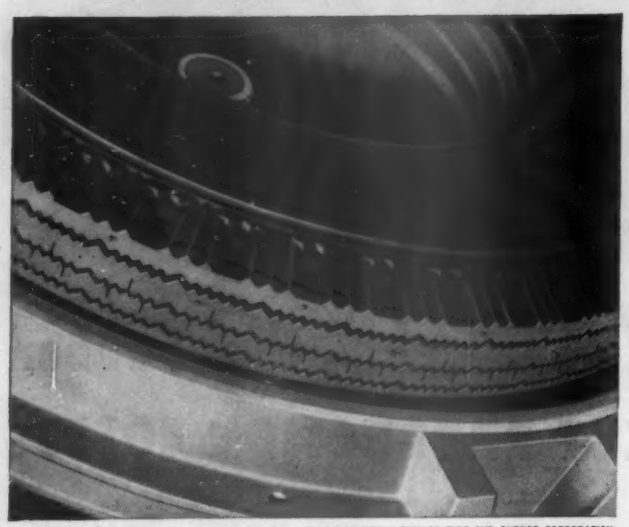

PHOTO COURTESY DUNLOP TIRE AND RUBBER CORPORATION

*After three months without cleaning, molds treated with a solvent solution of DC Mold Release Fluid easily release tires with very sharp, well-defined patterns.*

### Molds Stay Cleaner, Patterns Are Sharper

Lower maintenance and operating costs, reduced scrap and improved finish are among the advantages of DC Mold Release Fluid realized by rubber companies in all parts of the world. These advantages have resulted in a steadily increasing demand that has enabled us to produce larger quantities of DC Mold Release Fluid at a lower unit cost. We are passing these savings on to you in a new price reduction amounting to 9 per cent.

Price, however, is relatively unimportant compared with savings in production costs and improved quality resulting from use of DC Mold Release Fluid. In molding automobile and tractor tires, for example, Dunlop Tire and Rubber Corporation of Buffalo, New York, sprays a dilute solvent solution of DC Mold Release Fluid on the surface of talc-free green tires. After more than three months of operation, the molds are essentially as clean as they were when first placed in service and a major source of dust and dirt in the plant has been removed.

Our silicone release agents are semi-inorganic in nature and neither carbonize nor form a build-up on the mold. Molds, therefore, stay cleaner longer, reducing mold maintenance to a minimum. Cleaner molds and the inherent lubricity of DC Mold Release Fluid mean easy release of tires with sharper detail and high polish.

**DOW CORNING CORPORATION, MIDLAND, MICHIGAN**

Chicago: 228 N. LaSalle Street • Cleveland: Terminal Tower
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PHONE OUR NEAREST BRANCH OFFICE OR WRITE FOR OUR NEW 16-PAGE PAMPHLET NO. C-12-V DESCRIBING DOW CORNING SILICONE MOLD RELEASE AGENTS

Dow Corning
FIRST IN SILICONES




against the back of the steel belt, are five heating shoes to obtain uniform cure on both sides of the material.

The drum and shoes can be heated internally by steam to give a material temperature of approximately 280° to 300° F. for rubber and 300° to 340° F. for plastics. For gauge control, the material is fed to the drum over the lower pressure roll which can exert pressure up to approximately 100 pounds per linear inch.

The lower pressure roll is internally heated by steam to preheat the material and thus reduce the time of passage around the main drum. Where required for post-heating, the top roll can also be steam-heated.

The machines are equipped with necessary electrical equipment and speed change gear box to provide operation over a wide speed and vulcanizing cycle range.

---

## Risselt Air Eliminator Valve

Development of a new industrial-use air eliminator valve for special application in steam processing operations involving pressure up to 125 pounds was recently announced by the Risselt Division of the Lodge & Shipley Co., 800 Evans St., Cincinnati 4, Ohio. Made in two parts of heavy brass bar stock, the functioning mechanism is a 1½-inch 12-convolution thermostatic bellows of Monel metal. In the event the valve seat should for some reason become damaged it can readily be replaced at low cost. The valve does not have to be replaced. A standard ¾-inch male pipe thread is the connecting factor. The top of the valve has a standard ⅜-inch pipe thread connection for disposing of condensate. The thermostatic bellows is activated by temperature alone. There are two milled flats on each top and bottom of the valve for the purpose of applying wrenches for installation or for assembly and dis-assembly of the valve. Called the Risselt J-7 Air Eliminator Valve, it finds application in the rubber, chemical, textile and other industries.

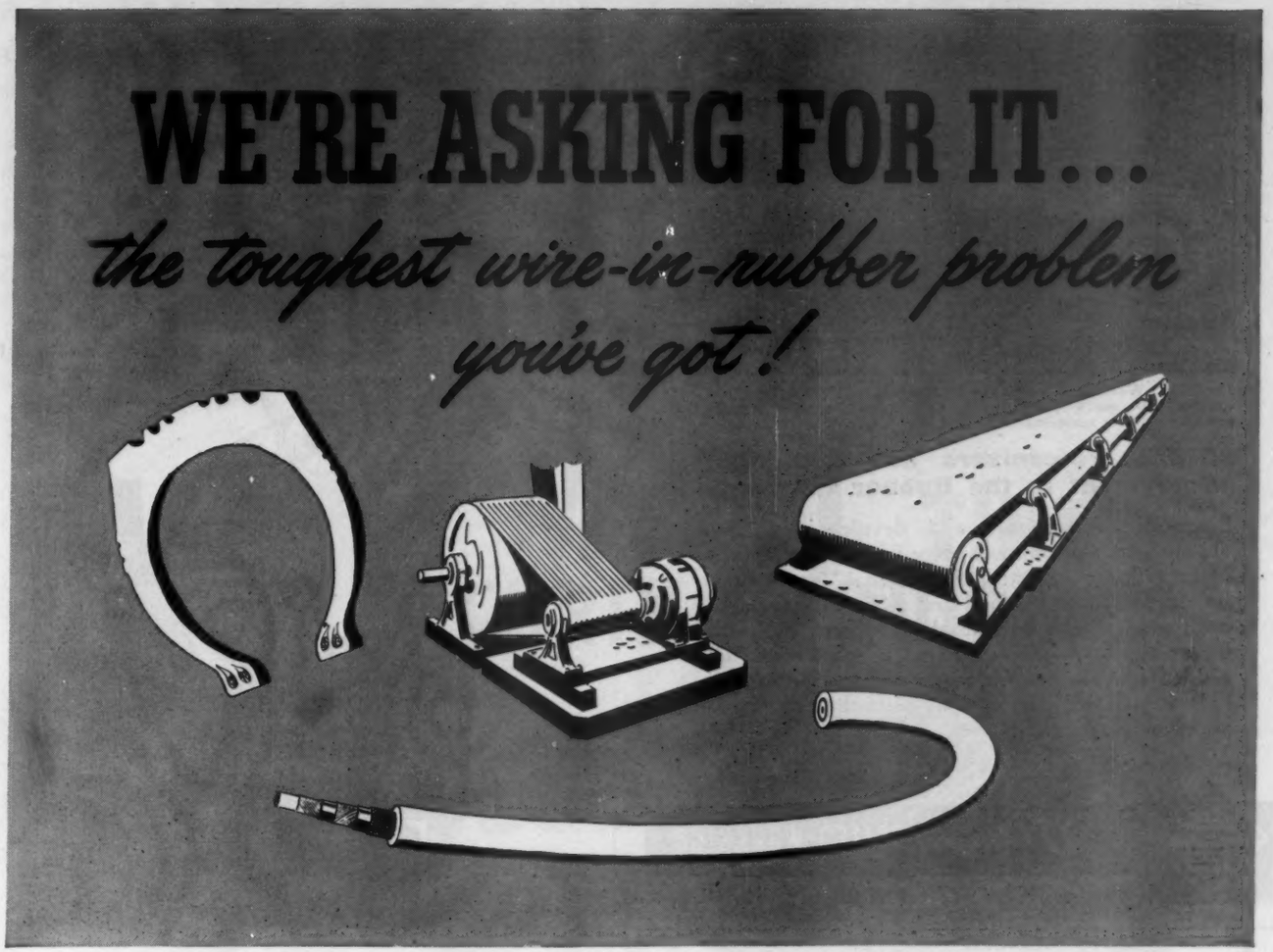
---

REMOVE THE NERVE WITH PHILBLACK A

FOR FURTHER DETAILS, SEE AD ON PAGE 404

# WE'RE ASKING FOR IT...

## *the toughest wire-in-rubber problem you've got!*



EXACTLY. If you have a tough problem involving the application of wire to rubber . . . or if you need to find just the *right* wire for the results you want, we offer you our help.

Here at National-Standard we are continually developing special wire for new products; better wire and improved methods of application for every conceivable wire-and-rubber combination . . .

. . . WIRE FOR TIRES—braided wires, wire tape and single wires, and cost-saving application machinery—developments that go far today in making bead failures a rarity . . .

. . . WIRE FOR BELTS—strong, high-precision wire, twisted and stranded into fine wire rope to give V-belts, flat belts and conveyor belts much longer life and far greater load capacity than ever before . . .

. . . WIRE FOR HOSE AND TUBING—wire of any drawable metal in flat or tubular braids of many types, to meet any requirement from the shielding of fine radio wire to the reinforcement of hose carrying tremendous fluid pressures.

In close cooperation with engineers in the rubber industry and in other fields, National-Standard has helped perfect these and many other important applications. Developing and producing special wire for special purposes has been our main job for almost 40 years. So perhaps our experience, our unique engineering and manufacturing facilities can help you with your wire and wire fabricating problems . . . starting with the toughest one you've got!

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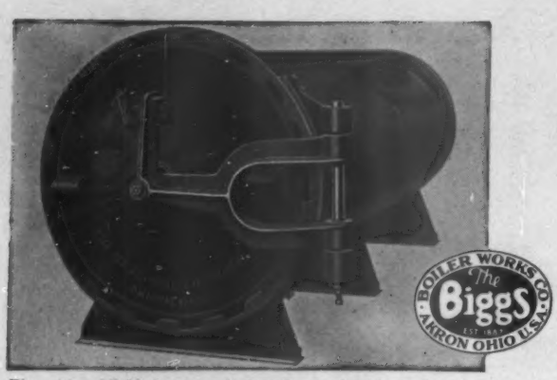


Fig. 17. Welded steam-jacketed, staybolt-less, horizontal vulcanizer with quick-opening door. All sizes; various working pressures. Low maintenance.

**BIGGS Vulcanizers are Standard Equipment in the Rubber Industry**

Biggs-built vulcanizers and devulcanizers have always had a prominent place in the development of the rubber industry. For over 47 years Biggs has furnished single-shell and jacketed vulcanizers both vertical and horizontal, as well as many different types of devulcanizers. Biggs modern all-welded units with quick-opening doors are available in all sizes for various working pressures—with many special features.

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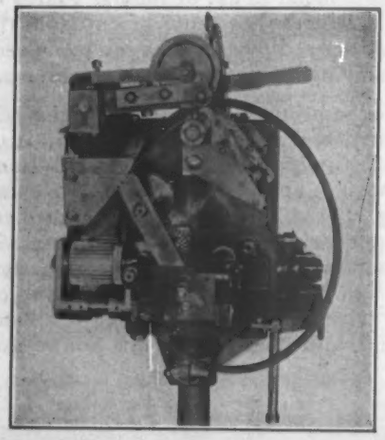
**Utility Crimper Type Flipper**

***for***

**Truck and Large Balloon Tires**



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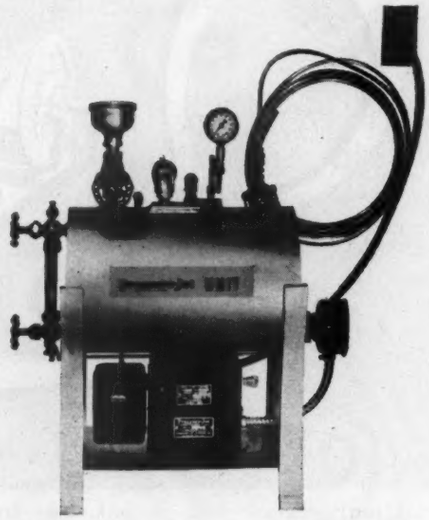
## Steam Return Line Treatment

A new steam condensate return line treatment, which is said to be entirely different in principle and method of operation than anything else on the market, is currently being offered to industry by Pressure-Jet Systems, Inc., 333 West Reservoir Ave., Milwaukee 12, Wisc. It is known as the Pressure-Jet System and is used by one rubber manufacturer for steel platens on a belt press.

The Pressure-Jet System of corrective treatment comprises two factors: the Pressure-Jet Unit and Pressure-Jet Fluid. This fluid, electrically heated in the



unit, is atomized into the steam main beyond the boiler at high temperature and adjusted to the pressure of the steam system. Because its temperature is higher than that of the steam into which it is atomized, the fluid entrains with the steam which acting as a vehicle carries it to all parts of the system, no matter how remote from the boiler.

It treats every radiator, trap, return line, and all steam operated equipment. Existing scale, oil sludge, rust and other products of corrosion are dissolved into minute particles and held in suspension, flowing off with the condensate. It is alkaline and non-caustic and will not injure ferrous or non-ferrous metals, packings or gaskets. It neutralizes the acidity caused by oxygen and carbon dioxide, preventing the formation of carbonic acid. The unit is easily installed and is completely automatic. Operated either on 110 or 220 volt AC or DC.

---

A new piece of apparatus for the laboratory is the **Whiz-Mixer,** a new, small mixing unit with a stainless steel bowl, now being featured by the Colloid Equipment Co., Inc., 50 Church St., New York 7, N. Y. Only 14 inches in height, with a base diameter of 6¾ inches, the unit has a capacity of 1 quart. According to the company, it will make dispersions and emulsions within minutes as compared with hours required in ordinary mixing.

# Whittle off Your Production Cost

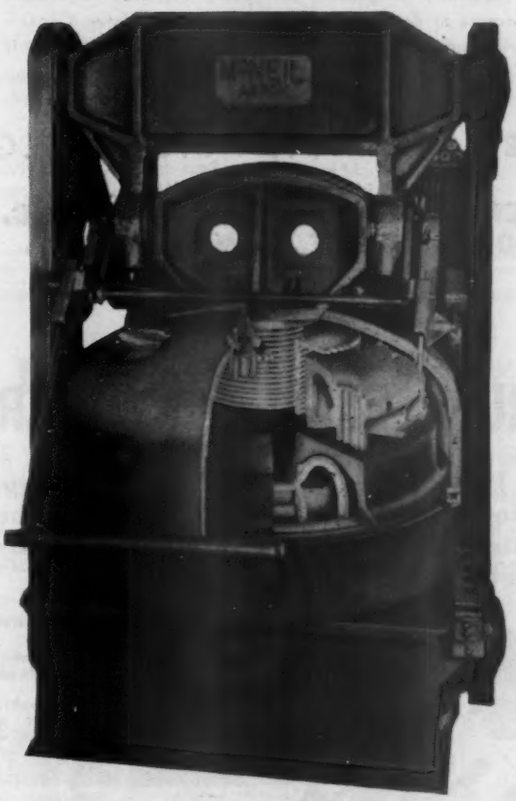
## With McNEIL TIRE CURING EQUIPMENT

**1** Labor and power saving. Our patented method for stripping any size of tire takes most of the work out of the job. One man can operate a large battery of presses. Very little power is required, as our electrically operated unit requires power for only a few seconds during each cycle, to open or close the press.

**2** High production, resulting in lower costs due to almost continuous curing. One-half minute to two minutes for changes, depending upon size of tire being cured.

**3** Wide range of flexibility and fast mold changing. Simple and rugged design of mechanism for adjustment to suit mold thickness.

**4** Better cures, because of open steam method of curing, plus individual temperature and pressure control, plus cooling if desired. All presses are heavy duty type for high internal pressures.



**Model 675-65"-18D Single**

*All the experience and engineering skill of the McNEIL organization is at your call to help you increase efficiency and speed while lowering production costs. For tomorrow's production, check with McNEIL today.*

**MANUFACTURING AGENTS** GREAT BRITAIN—Francis Shaw & Co. Ltd., Manchester, England
AUSTRALIA and NEW ZEALAND—Chas. Ruwolt Proprietary, Ltd., Victoria, Australia.

## THE McNEIL MACHINE & ENGINEERING CO.

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RUBBER WORKING MACHINERY • INDIVIDUAL CURING EQUIPMENT FOR TIRES, TUBES and MECHANICAL GOODS

# ROBINSON
PROCESSING UNIQUE EQUIPMENT

**Fine, Finer, Finest . . . Coarse, Coarser, Coarsest!**

ROBINSON
Attrition Mills

Attrition Mills for grinding all types of material. Adjustable for coarse or fine grinds. Hard iron grinding plates. Capacities to your requirements. Robinson Processing Equipment is designed by engineers whose reputation is founded upon doing things right. Literature available. Inquiries invited.

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*Plant: Muncy, Pa.*
SALES REPRESENTATIVE
**MERCER-ROBINSON COMPANY, INC.**
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SIMPLEX
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# RUBBER STRIP CUTTER
PATENTED

**A PORTABLE machine capable of stripping slab rubber up to 1" thick at the rate of 20,000 feet in 8 hours. Any width desired.**

SPECIAL FEATURES
- Has micro-adjustment for accurate widths.
- Equipped with water tank which feeds water to the slotted knife and to the cut.
- Has repulsion-induction motor which carries any overloads.
- Automatic sharpener device keeps knife keen and sharp.
- Has base with rollers and is very easy to handle.

Cuts within 1/64 inch to 1/100 inch tolerance depending on grades of rubber. Cuts a slab down to the last shaving. Cuts all grades of rubber including pure gum, sponge, etc. Cuts squarely—no rejects.

*Now in use by many leading Rubber Manufacturers & Jobbers*

**Simplex Cloth Cutting Machine Co., Inc.**
*Manufacturers of a Complete Line of Cloth Cutting Machinery*
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*Cable Address*—SIMPLEX, N. Y. *Phone*—WIsconsin 7-5547




## Heintz Superflex Platen Presses

Putting its years of experience and engineering knowledge in building electric and tire curing molds, James C. Heintz & Company, Cleveland, Ohio, has introduced a line of small, flexible, electrically-heated platen presses. These presses, which deliver from 3600 pounds to 20,000 pounds pressures, due to their speed and flexibility, promise to meet a real need in the rubber, plastics, printing and other fields.

The presses operate on ordinary 100 to 200 pound airlines so they can be installed readily anywhere without undue installation expense. Too, their action and clearance can be regulated by the operator to handle any particular product or operation. The machines have met with success in molding small rubber items, plastic electrical parts, and in similar operations where speed and flexibility are paramount. The low cost of the presses and mold equipment has been an appealing feature to small and large shop alike. Model 1012 is illustrated herewith.

**LESS ACCELERATION WITH PHILBLACK A**


FOR FURTHER DETAILS, SEE AD ON PAGE 404

# SMACO GASKET SPLICER

and

## Vulcanizer

- SPLICES
- MOLDS
- EMBOSSES

FEATURES

Speed of operation • One operator handles up to six units • No mechanical breakdowns • Heat controls in both platens • Splices gaskets up to 3" in diameter, right angles or T-joints.

SPECIFICATIONS

Bench Space 5" x 6" — Bench Overhang 9"
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- Complete Plant Design and Layout; also Special Machinery Developed and Manufactured.
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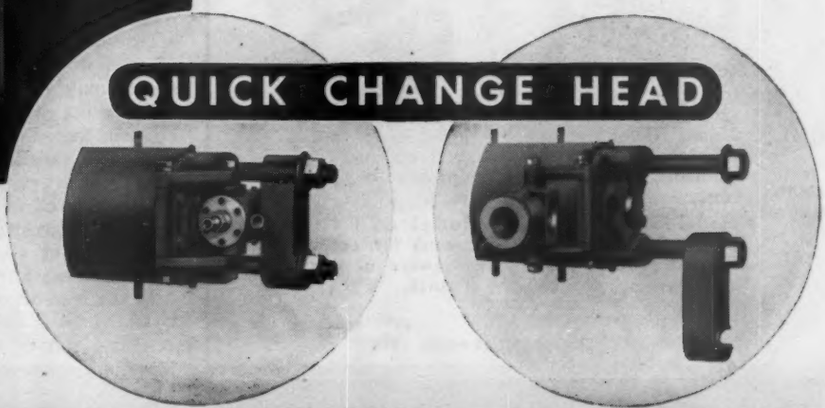
ROGER WILSON & CO., LTD. Speaking Tile Walk, Birmingham 15, England

NE Quick Change Head Unit permits swinging Die Head out, for cleaning, inspection or changing. Just loosen 2 bolts. This feature illustrated on a 3½" NE Tuber is available on all sizes thru 6".

## NE TUBERS *adaptable to*

**variety of products. Illustrated at left is a 4½" NE tuber equipped with cross-feed flanged-type head for insulating wire, extruding hose covering, special shapes or tubing. With slight modifications, either rubber or plastics can be handled.**

QUICK CHANGE HEAD



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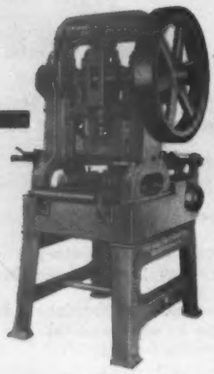
ERIE, PA. U. S. A.

# Rubber Cutting Machines with a Lifetime of Uniform Quality

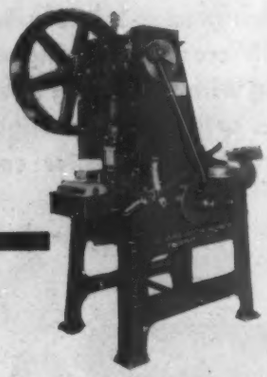
ENGINEERED TO MEET YOUR PARTICULAR REQUIREMENTS



MODEL A2

*COULTER RUBBER CUTTING MACHINES have been used successfully for years and years in the cutting of continuous volumetric control and stripping for Heels, Soles, Taps and other molded products.*

MODEL A1



- **Model A1 for Heels at high speed production, or short runs.**
- **Model A2 for Multiple Heels, Half and Full Soles with stock grain.**

MODEL A3

- **Model A3 for Multiple Heels and Taps with or across stock grain.**
- **Model A2S (Not shown) for cutting crosswise of grain of stock.**

PRODUCTION MACHINES SINCE 1896

The James COULTER Machine Co.

BRIDGEPORT • CONNECTICUT • U.S.A.




## Three New Taber Accessories

Three new accessories developed for use with the Taber Abraser in wear-testing a wide range of materials have been announced by the Taber Instrument Corp., North Tonawanda, N. Y.

The first, the Interval Timer, is an electrical attachment which permits operating time of abrasion tests to be controlled within predetermined limits, thereby eliminating losses of tests resulting from accidentally running tests past the prescribed end point and also enabling testing executives to concentrate on other research analyses while the Abraser operates unattended.

Second is the Duplex Refacing Stone, a development designed for periodically refacing Calibrase-type abrading wheels that provides greatly improved control of wheel surfaces and assures more dependable standardization of wheels than previously possible. Replacing the abrasive-coated paper discs formerly supplied for this purpose, it also proves more economical to use by virtue of its longer wear-life.

Third is Abraser Drymount, a dual-coated adhesive sheet that simplifies and speeds preparation of thin, flexible fabrics or other similar materials for wear-testing.

## Report on Technology Conference

*(Continued from Page 464)*

economic advantages are apparent for tires of all dimensions and uses.

High-tenacity viscose rayon, the development of which is still in progress, and nylon or Perlon yarns, which also have interesting properties, will therefore be the favored textile materials for the construction of tires for power-driven vehicles in the coming years.

**Latex-Reclaim-Casein Mixtures for Rubber-Cord Fabric Adhesion. *E. R. Gardner and P. L. Williams (Avon India Rubber Co., Ltd., Melksham, England).***

A good bond, resistant to flexing, is afforded between rubber and rayon cord by the interposition of a mixed casein-rubber film. In a series of solutions in which the amount of rubber solids was kept constant and the quantity of casein varied progressively, it was found that there was an optimum amount of casein for maximum adhesion. Taking into consideration also the handling of the solution and the stiffening of the cord, it would appear that for an adhesive with the usual total solids content of 15 to 20%, the ratio of casein to rubber hydrocarbon should be approximately 1:6.

When the rubber hydrocarbon content is supplied by dispersed reclaim, the adhesion is a little higher than when latex is used. The most satisfactory solution from all points of view, however, contains approximately equal quantities of rubber hydrocarbon derived from the two sources.

Wetting agents may be employed to improve the uniformity of application of the adhesive. The amount used must be quite small, otherwise the adhesion is impaired.

It has been shown by dipping cord successively in casein and latex solutions and vice versa that in the adhesive film casein acts as a specific adhesive for rayon, whereas the rubber in the film gives the necessary affinity for the casing rubber which surrounds it. Treating a cord successively in a casein-rich mixture and then in a rubber-rich mixture appears to give a slightly better bond than the conventional treatment.

The subsequent application of a rubber cement to a cord dipped in latex-reclaim-casein solution results in an improvement in the bond.

## RANDALL & STICKNEY

### Hand Grip Rubber Gauge No. 3-B

| | | | | | |
|---|---|---|---|---|---|
| Height | .....9" | Length | .....9¾" | Range | .....½" |
| Depth of Throat | ...6½" | Dial 50 Divisions Each Div. 1/1000" | | Weight | ....4 lbs. |
| | | | | Frame | . Aluminum |

Designed for gauging stock as it is coming from the calender.

**FRANK E. RANDALL CO., Waltham 54, Mass.**

## Don't GUESS at Roll Temperature

The scorching of rubber is a needless waste . . . and is preventable. Make the use of Cambridge Pyrometers routine procedure for checking temperatures during calendering, mixing, extruding and molding. They are accurate, rugged, quick-acting instruments that take the guesswork out of temperature determination.

ROLL MODEL

Needle-model for checking within-the-mass, mold model for reaching into mold cavities and combustion models also available. Send for bulletin 1948.

**CAMBRIDGE**

*ROLL • NEEDLE • MOLD*

**PYROMETERS**

**CAMBRIDGE INSTRUMENT CO., INC.**
**3754 Grand Central Terminal, New York 17, N. Y.**

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**Continuous Extruding Machines for the Rubber, Plastic and Chemical Industries**

**Continuous Vulcanizing Machines for Rubber Insulated Wire**

**Plastic Insulated Wire Machines**

**Light Wire and Cable Capstans**

**Strainers** **Motorized Take-Ups**

**Cooling Troughs** **Temperature Control Units**

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## JOHN ROYLE & SONS

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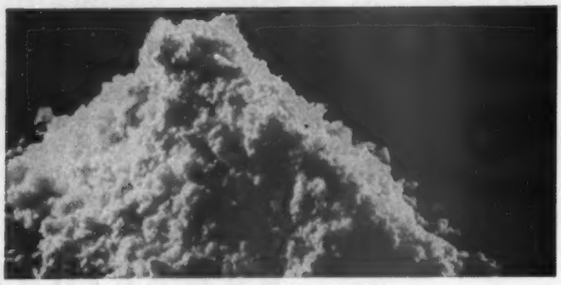
|---|---|---|---|
| James Day (Machinery) Ltd. | E. B. Trout J. W. VanRiper | J. C. Clinefelter | H. M. Royal, Inc. |
| REgent 2430 | SHerwood 2-8262 | JEfferson 3264 | LOgan 3261 |

**PATERSON 3, NEW JERSEY**

Rayco Fillers

For Non-Marking Sole Compounds



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REGISTERED UNDER U. S. No. 431,067

Early in our pioneering efforts as flock producers, we recognized that the special needs of the Rubber Industry call for a special group of fillers. Here in "Filfloc" is a product developed specifically to enhance strength, as well as impart non-marking qualities. Through experience and joint research with you, we furnish various types of "Filfloc" to meet EXACTLY your needs for compounding crude, synthetic or reclaim.

REQUEST FREE WORKING SAMPLES

Rayon Processing Co. of R. I., Inc.

PIONEER PRODUCERS OF COTTON FILLERS FOR PLASTICS

100 MOSHASSUCK ST., PAWTUCKET, RHODE ISLAND

# REVIEWS

## BOOKLETS, CATALOGS, etc.

**Patterson Pebble, Ball and Tube Mills.** (Catalog 482). Patterson Foundry and Machine Co., East Liverpool, Ohio. 8½ x 11 in. 44 pp.

This new catalog covers Patterson's complete selection of batch type pebbble and ball mills and continuous feed and discharge tube mills, classifying devices of all types, and grinding plants. The company's mill drive, equipped with magnetic brake and inching device, dustless discharge housings for pebble mills, laboratory jar mills, continuous feed and discharge ball and tube mills, rod mills, closed circuit dry and wet grinding and polishing mills, wet grinding and classifying systems which can carry classifying and processing operations to almost any desired length, are all clearly illustrated and described in detail. Also featured in the catalog are Patterson Gyro-Centric Screens for dry-screening, separating, classifying, cleansing, reclaiming, and general dry process work, and for wet sifting or screening of liquids, dewatering operations, etc., in the processing of chemicals, food products, ceramics, rock products, metallics, plastics, and other materials.

•

**Yale Hand Lift and Worksaver Pallet Trucks.** (Bulletin P-673). Yale & Towne Mfg. Co., Philadelphia, Penna. 8½ x 11 in. 20 pp.

The uses of the pallet system in industrial operations are described and illustrated in this two-color booklet. Recommended pallet designs are offered, including double-face reversible pallets, double-face non-reversible pallets, four-way entry pallets and single-face pallets. Cutaway illustrations of hand truck mechanisms are provided, and the advantages of both the mechanical and the hydraulic lifting mechanisms are discussed. Special attention is paid to the Worksaver, a powered hand truck in which both lifting and motivation are powered by battery. Capacity, weight, speeds, lift, dimensions, and electrical, mechanical and general characteristics are given for the pallet, tin-plate, tilting fork, and non-tilting fork units.

•

**Quick Delivery.** Hydraulic Press Mfg. Co., Mount Gilead, Ohio. 7¾ x 10½ in. 8 pp.

Among the H-P-M products described in detail in this new equipment stock list are metal working presses, die casting machines, plastic molding machines, turbojectors for rubber molding, laboratory presses, hydraulic boosters, gear pumps, power units, and variable delivery radial pumps. Among the service equipment listed are hydraulic valves for water pressure service, miscellaneous valves, pumps, electrical equipment, and large cap screws in a variety of sizes. Many of the items described are illustrated.

•

**Rayon Cord Opens the Door to a New Era in Tires.** Industrial Rayon Corp., Cleveland, Ohio. 5 x 7 in. 20 pp.

Highlights in the history of tire development from carriage days to the present are recorded in this booklet by way of introduction to a detailed presentation of the rayon story. Animated cartoon studies, production photos and a comprehensive flow chart tracing all the steps in the integrated manufacture of rayon cord fabric by the company's continuous process, answer virtually all the questions that a tire dealer or motorist could ask about rayon cord tires.

**Collective Bargaining In the Office.** (Research Report No. 12). American Management Association, 330 West 42nd St., New York 18, N. Y. 6 x 9 in. 120 pp. $5.00.

The last decade has seen administrators in many offices confronted with collective bargaining for the first time. Executives will find in this AMA research report a comprehensive selection of typical and novel clauses covering office employees based on an analysis of 300 union agreements. These are not necessarily recommended clauses. Some of them, in fact, are not precisely suited to office conditions and are apparently hold-overs from agreements with production workers. They are presented objectively as characteristic of clerical union agreements. Information contained in this report on the various phases of personnel administration as they have been handled through collective bargaining is valuable, also, to the non-union office. It provides a foundation for an audit of personnel practices to determine whether unionized office employees are obtaining more advantageous conditions than those in a particular unorganized office.

•

**Unicel S.** (Report No. 48-2). By L. S. Bake. Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. 6 x 9½ in. 8 pp.

Specific advantages of Unicel S, a new sponge blowing agent in which the active ingredient is finely divided sodium bicarbonate and which is said to have five times greater efficiency than ordinary sodium bicarbonate, are emphasized in this report. The report includes a description of properties of the new sponge blowing agent, together with data on the application of the material in both natural rubber and neoprene sponge. Several recommended formulas are shown, with data given on both density and blow of press-cured samples.

•

**Permanent Magnet Sub-Assemblies.** Metallurgy Division, Chemical Department, General Electric Co., Pittsfield, Mass. 8½ x 11 in. 4 pp.

Devoted to a description of the company's permanent magnet sub-assemblies, this booklet discusses how these magnetic sub-assemblies eliminate assembly line rejects, the high cost of test equipment, breaking and chipping losses, and the expense of shipping semi-finished magnets. Among the sub-assemblies illustrated are the magnetic focusing sub-assembly, the Titan Valve sub-assembly, the magnetron sub-assembly, the cable clamp sub-assembly, a radar jammer tube, and a snap action switch.

•

**The United States Market for Latex Foam.** Rubber Development Bureau, 1631 K St., N. W., Washington 6, D. C. 6 x 9 in. 24 pp.

Based on a study of the United States market for latex foam by National Analysts, Inc., for the Rubber Development Bureau, this digest summarizes the results of personal interviews with more than 2,400 consumers, distributors and manufacturers in every part of the country. The survey reveals that 52 million consumers are prospects to buy 54 million latex foam articles in the next five years. This would take 180,000 tons of latex foam.

•

**Unusual Adhesive Products.** Adhesive Products Corp., 1660 Boone Avenue, Bronx 60, N. Y. 7½ x 9 in. 20 pp.

The different adhesives which the company produces are discussed in this booklet. Adhesives for adhering vinyls and other plastics to leather, paper, metal, or to vinyl itself are elaborated upon. Cements for luggage and leather goods, tile, concrete, wood, etc., are also discussed. Mention is made of cleaners for removing rubber cement and latex cement, and of plastic rubber fabric paints which the company produces.


NA-11

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★ Increases Rate of Cure of Neoprene and Neoprene Latex

★ Safe Processing

★ Does Not Affect the Stability of Neoprene Latex Compositions

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DU PONT

As a MOLD LUBRICANT

—Orvus permits articles to leave molds readily; molds clean easily.

—Orvus is effective in hardest water.

—Orvus forms no insoluble materials which might be deposited as a film on mold or rubber.

For WASHING and FINISHING

—Orvus cleans thoroughly such articles as inner tubes, automotive parts and other molded and extruded rubber goods. Leaves articles with a pleasing finish.

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Vulcanized
VEGETABLE
OILS
RUBBER SUBSTITUTES
Types, grades and blends for every purpose, wherever Vulcanized Vegetable Oils can be used in production of Rubber Goods—be they Synthetic, Natural, or Reclaimed.
*A LONG ESTABLISHED AND PROVEN PRODUCT*
THE CARTER BELL MFG. CO.
SINCE
CARTER BELL PRODUCTS
1903
SPRINGFIELD, NEW JERSEY
Represented by
HARWICK STANDARD CHEMICAL CO.
Akron, Boston, Trenton, Chicago, Denver, Los Angeles



**Neoprene Type S As a Processing Aid in Neoprene GR-M or GR-M-10 Compounds.** (BL-225). Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. 6 x 9½ in. 8 pp.

The use of Neoprene Type S as a processing aid in GR-M or GR-M-10 compounds is discussed in this technical report. The report discusses the processing of blends, and then shows the results obtained by utilizing Neoprene S in low durometer compound as to Williams plasticity and recovery, tensile strength, elongation and durometer hardness. The use of the processing aid in loaded compounds is also discussed, as are recommendations for specific applications. Attention is paid to the use of Neoprene S in extruded goods and sundries as well as in rolls.

•

**Silicones.** (No. CDR-57). Resin and Insulation Materials Division, Chemical Dept., General Electric Co., Pittsfield, Mass. 8½ x 11 in. 30 pp.

This illustrated bulletin describes in detail the silicone products produced by the company, including the new silicone resins, oils, greases, water repellents and rubber, together with their many industrial uses. Charts and tables which outline the properties and physical characteristics of the various silicones are included for handy reference.

•

**R-S Valves.** (Catalog No. 17). R-S Products Corp., Wayne Junction, Philadelphia 44, Penna. 8½ x 11 in. 48 pp.

The numerous types of R-S valves made by the company for precise control and shut-off are described and illustrated in this new catalog. The manual controls employed, including hand and chain levers and hand and chain wheels, are discussed, and the various accessories described. Among the numerous valves featured by the company are both rubber-seated and rubber-lined valves.

•

**New Falk Motoreducer.** (Bulletin 3101). Falk Corporation, Milwaukee 8, Wisconsin. 8½ x 11 in. 4 pp.

This bulletin introduces the new line of Falk All-Steel Motoreducers, said to be a worthy successor to the well-known series placed on the market by the company some 16 years ago. The bulletin illustrates and describes the complete line which includes horizontal and vertical units in both integral and all-motor types for floor, wall or ceiling mount.

# THIONEX

**a high speed accelerator**

*by*

## Du Pont

**has these advantages in rubber and GR-S**

★ GIVES FAST CURES ★ GOOD AGING

★ SAFE ★ NON-DISCOLORING

★ DELAYED ACTION ★ NON-BLOOMING

★ STABLE IN MASTER BATCHES

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# MARKETS

***Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings***

**NEW YORK, JULY 8, 1948**

## Natural Rubber

The price of spot rubber on the Commodity Exchange has swung in a range of .75 cents since our last report (June 11), high for the period being 23.50 cents, reached on July 6, and again on July 7, and low for the period being 22.75 cents on June 24, and again on June 25. The average price of spot rubber for the month of June was 22.80 cents, based on 22 trading days. This compares with an average of 23.39 cents for May.

Natural rubber prices have been moving progressively upward and have reached a level, basis No. 1 Ribbed Smoked Sheets, of approximately five cents a pound over GR-S. What effect a further advance in natural rubber will have on U. S. consumption is a moot question, but undoubtedly synthetic rubber will increase at the expense of natural.

The Registrar of Statistics at Singapore recently announced that Malaya shipped 87,368 tons of rubber abroad in June. The U. S. was the largest purchaser with 38,355 tons. The U. K. was second with 13,200 tons. The Soviet Union purchased 5,531 tons, slightly less than last month's 5,761 tons, but still far above normal Soviet purchases. Trade sources said heavy Russian purchases are expected to continue.

With funds made available as of July 1 of $300,000,000, buying of strategic commodities for the Government stockpile will probably be stepped up. Rubber is being purchased for Jan./Mar. and April/June of next year with the Government buying No. 1 as well as No. 3 Ribs.

Today's quotations in the outside market, London and Singapore, follow:

### Outside Market

| | |
|---|---|
| No. 1 Ribbed Smoked Sheets: | |
| Spot | .23⅜ |
| July-September | .23¼ |
| October-December | .23⅛ |
| Thin Latex Crepe: | |
| Spot | .26½ |
| July | .26¼ |
| Thin Brown Crepe, No. 2 | .18¾ |
| Ambers, No. 3 | .18¼ |
| Flat Bark Crepe | .12¼ |

### London Market

*(Standard Smoked Sheets)*

| | |
|---|---|
| September | 23.87 - 24.08 |
| October-December | 22.95 - 23.06 |

### Singapore Market

*(Standard Smoked Sheets)*

| | |
|---|---|
| July | 22.03 - 22.19 |

## Synthetic Rubber

*(Dry Types)*

| | |
|---|---|
| Butaprene NF | .390 - .415 |
| Butaprene NL | .400 - .425 |
| Butaprene NAA | .440 - .465 |
| Butaprene NXM | .470 - .495 |
| Chemigum 30 N4NS | .400 - .470 |
| Chemigum 50 N4NS | .400 - .470 |
| Chemigum N3 | .450 - .520 |
| Hycar OR-25 | .400 - .425 |
| Hycar OR-15 | .470 - .495 |
| Hycar OS-10 | .400 - .425 |
| Neoprene Type E | —— - .650 |
| Neoprene Types CG and AC | —— - .500 |
| Neoprene Types FR and KNR | —— - .750 |
| Neoprene Type S | —— - .320 |
| Neoprene Type NC | —— - .250 |
| Perbunan 18 | .390 - .415 |
| Perbunan 26 | .400 - .425 |
| Perbunan 35 | .470 - .495 |
| Thiokol Type A | .370 - .470 |
| Thiokol Type ST | .750 - .850 |
| Thiokol Type FA | .520 - .620 |
| Thiokol PR-1 | .750 - .850 |

## Scrap Rubber

The scrap rubber market continues exceedingly dull with little change anticipated for the nevt several months. Reclaimers' inventories are still fairly large and the export market is still surrounded with exchange difficulties. No changes in the price structure have been announced since our last report. Current quotations follow:

(Prices to Consumers, Delivered Akron)

| | | |
|---|---|---|
| Mixed passenger tires | ton | $12.00 |
| Beadless truck tires | ton | nom. |
| Mixed truck tires | ton. | 12.00 |
| Beadless passenger tires | ton | nom. |
| No. 1 passenger peelings | ton | 42.50 |
| No. 1 truck peelings | ton | 42.50 |
| Red passenger tubes | lb. | .06¼ |
| Black passenger tubes | lb. | .03½ |
| Mixed passenger tubes | lb. | .03¼ |
| No. 2 truck tubes | lb. | nom. |
| Red truck tubes | lb. | .06 |
| Black truck tubes | lb. | .03 |
| Buffings | ton | 15.00 |

## Reclaimed Rubber

Demand for reclaimed rubber, despite the relatively high price of natural rubber, continues the slight declining trend noted in recent months. Preliminary figures indicate a consumption of 22,188 long tons in May, which compares with 22,322 in April and represents 25.3% of total rubber consumption for the month. The Barberton, Ohio, plant of the Midwest Rubber Reclaiming Co. suffered a short strike earlier this month. There has been no change in the price structure. Current quotations follow:

| | | | |
|---|---|---|---|
| ***Tires*** | | | |
| Black, Acid | lb. | .08¾ @ | .09¼ |
| Black, Digester | lb. | .08 @ | .08½ |
| Peels | lb. | .09 @ | .09½ |
| GR-S Whole Tire | lb. | .08½ @ | .09 |
| ***Inner Tubes*** | | | |
| Black | lb. | .12¾ @ | .13¼ |
| Red | lb. | .13½ @ | .14 |
| GR-S | lb. | .09½ @ | .10 |
| Butyl | lb. | .08½ @ | .09 |
| ***Shoe*** | | | |
| Unwashed | lb. | .08¼ @ | .08¾ |

## Cotton Tire Fabrics

The recently revived demand for tire fabrics, both cotton and rayon, as well as chafers, has continued during the past month. Cotton mills predict the demand will continue strong for the next several months from domestic manufacturers while substantial export orders are anticipated once the Marshall Plan gets into full swing. There has been no change in the price structure since our last report. Current quotations follow:

| | | |
|---|---|---|
| Standard, Peeler, 12/4/2 | lb. | .7600 |
| Standard, Peeler, 14/4/2 | lb. | .7800 |
| Standard, Peeler, 16/4/3 | lb. | .8050 |
| Extra Staple, Peeler, 12/4/2 | lb. | .8575 |
| Extra Staple, Peeler, 14/4/2 | lb. | .8775 |
| Extra Staple, Peeler, 16/4/3 | lb. | .9025 |

### Chafers

| | | |
|---|---|---|
| 14.4 oz. (per sq. yard) | lb. | .7550 |
| 9.25 oz. (per sq. yard) | lb. | .7125 |
| 11.65 oz. (per sq. yard) | lb. | .6850 |
| 8.9 oz. (per sq. yard) | lb. | .7275 |

## Cotton

The price of middling uplands on the Cotton Exchange has swung in a range of 2.14 cents since our last report (June 11), high for the period being 38.28 cents on June 14, and low 36.14 on July 6. The average price of middling uplands for the month of June was 38.12 based on 22 trading days. This compares with an average of 38.57 cents for the month of May.

World reserves of raw cotton appear to have fallen about 10,000,000 bales in the past two seasons, according to the annual report issued by the Empire Cotton Growing Corp., Manchester, Eng. The report states that unless this trend is reversed by an expansion in world production, supply difficulties must arise in the near future. Total Empire cotton production last season was 612,755 bales, an increase of 7% over 1945-46.

A 1948 cotton crop about 10% above last year's, but smaller than the trade expected, was forecast recently by the Department of Agriculture. Cotton in cultivation on July 1 totalled 23,653,000 acres, or 2,153,000 more than last year. While the Department made no official forecast of production, it said unofficial computations indicate a 1948 crop of 12,927,000 bales. Last year's crop was 11,851,000 bales.

After the expiration of the Indo-Pakistan cotton trade agreement on July 15, there will be complete freedom for cotton export anywhere, up to the end of the crop year on August 31, the Pakistan Government advises. The export policy for the next cotton year will be announced some time next month.

Quotations for middling uplands on the Exchange follow:

| | June 11 | July 8 | | |
|---|---|---|---|---|
| | Close | High | Low | Close |
| July | 36.42 | 35.25 | 34.83 | 34.83 |
| October | 33.03 | 32.62 | 32.20 | 32.28 |
| December | 32.46 | 32.42 | 32.00 | 32.04 |

## *Closing Rubber Prices on New York Commodity Exchange*

FROM JUNE 12 TO JULY 8

| Date June | Spot | Sept. | Dec. | Mar. | May | Sales |
|---|---|---|---|---|---|---|
| 12 | —— | —— | —— | —— | —— | —— |
| 13 | —— | —— | —— | —— | —— | —— |
| 14 | 22.88 | 22.25 | 22.05 | 21.70 | 21.35 | 86 |
| 15 | 22.88 | 22.20 | 21.99 | 21.65 | 21.30 | 48 |
| 16 | 23.00 | 22.30 | 22.20 | 21.60 | 21.25 | 199 |
| 17 | 22.88 | 22.10 | 21.85 | 21.50 | 21.15 | 52 |
| 18 | 22.88 | 22.30 | 22.25 | 21.75 | 21.40 | 97 |
| 19 | —— | —— | —— | —— | —— | —— |
| 20 | —— | —— | —— | —— | —— | —— |
| 21 | 23.00 | 22.45 | 22.32 | 21.87 | 21.52 | 129 |
| 22 | 22.88 | 22.20 | 22.05 | 21.55 | 21.20 | 108 |
| 23 | 23.00 | 22.11 | 21.95 | 21.50 | 21.15 | 32 |
| 24 | 22.75 | 21.81 | 21.65 | 21.25 | 20.90 | 10 |
| 25 | 22.75 | 21.85 | 21.88 | 21.47 | 21.15 | 259 |
| 26 | —— | —— | —— | —— | —— | —— |
| 27 | —— | —— | —— | —— | —— | —— |
| 28 | 22.88 | 21.90 | 21.95 | 21.60 | 21.30 | 103 |
| 29 | 23.00 | 21.90 | 21.90 | 21.65 | 21.35 | 85 |
| 30 | 23.00 | 22.12 | 22.00 | 21.70 | 21.55 | 92 |
| July | | | | | | |
| 1 | 23.00 | 22.23 | 22.20 | 21.95 | 21.80 | 45 |
| 2 | 23.12 | 22.35 | 22.35 | 22.10 | 22.07 | 120 |
| 3 | —— | —— | —— | —— | —— | —— |
| 4 | —— | —— | —— | —— | —— | —— |
| 5 | —— | —— | —— | —— | —— | —— |
| 6 | 23.50 | 22.53 | 22.53 | 22.35 | 22.30 | 45 |
| 7 | 23.50 | 22.58 | 22.58 | 22.35 | 22.30 | 9 |
| 8 | 23.37 | 22.15 | 22.20 | 22.05 | 22.05 | 21 |

T-C

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•
# Natural Rubber
•
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WHITTAKER

# STATISTICS *Of Interest to the Rubber Industry*

## U. S. Imports and Re-Exports of Natural Rubber

| | GROSS IMPORTS | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Natural Rubber (Dry) | | | Natural Rubber (Latex) | | | Guayule | | | | RE-EXPORTS | | TOTAL NET IMPORTS |
| Year | Long Tons | Total Declared Value | Average Declared Value per pound Cents | Long Tons | Total Declared Value | Average Declared Value per pound Cents | Long Tons | Total Declared Value | Average Declared Value per pound Cents | Total Gross Imports Long Tons | Long Tons | Total Declared Value | Long Tons |
| 1936 | 467,064 | 152,072,496 | 14.54 | 19,852 | 6,659,899 | 14.98 | 1,229 | 286,552 | 10.41 | 488,145 | 12,581 | 4,488,223 | 475,564 |
| 1937 | 574,600 | 237,307,041 | 18.44 | 23,185 | 10,213,670 | 19.67 | 2,694 | 745,873 | 12.36 | 600,479 | 7,902 | 3,385,433 | 592,577 |
| 1938 | 397,620 | 125,357,730 | 14.07 | 11,878 | 4,147,318 | 15.59 | 2,485 | 623,819 | 11.21 | 411,983 | 5,652 | 1,799,124 | 406,331 |
| 1939 | 469,803 | 167,558,245 | 15.92 | 27,438 | 10,467,552 | 17.03 | 2,232 | 463,345 | 9.27 | 499,473 | 13,125 | 5,832,618 | 486,348 |
| 1940 | 780,820 | 303,117,726 | 17.33 | 33,789 | 14,593,466 | 19.28 | 3,634 | 758,007 | 9.31 | 818,243 | 7,060 | 3,197,136 | 811,183 |
| 1941 | 989,329 | 401,890,393 | 18.14 | 34,798 | 15,965,627 | 20.48 | 4,881 | 1,145,767 | 10.48 | 1,029,008 | 5,376 | 2,757,872 | 1,023,632 |
| 1942 | 265,980 | 112,377,896 | 18.86 | 10,646 | 5,630,667 | 23.61 | 5,523 | 1,660,792 | 13.42 | 282,149 | 10,856 | 5,913,386 | 271,293 |
| 1943 | 50,348 | 31,364,033 | 27.81 | 1,890 | 1,312,202 | 30.99 | 7,679 | 3,636,789 | 21.14 | 59,917 | 22,587 | 16,446,707 | 37,330 |
| 1944 | 103,820 | 73,908,389 | 31.78 | 3,091 | 2,092,211 | 30.22 | 6,700 | 3,351,233 | 22.33 | 113,611 | 9,739 | 8,712,695 | 103,872 |
| 1945 | 134,454 | 95,850,441 | 31.82 | 4,773 | 3,115,853 | 29.14 | 10,040 | 5,963,797 | 26.52 | 149,267 | 9,509 | 7,201,746 | 139,758 |
| 1947 | 690,954 | 306,919,456 | 19.83 | 17,722 | 9,820,080 | 24.91 | 2,880 | 1,492,825 | 20.30 | 711,556 | 4,122 | 2,354,494 | 707,434 |
| 1946: | | | | | | | | | | | | | |
| Aug. | 34,125 | 18,656,966 | 24.41 | 1,231 | 803,435 | 29.14 | 366 | 193,680 | 23.06 | 35,722 | 1,515 | 902,005 | 34,207 |
| Sept. | 41,311 | 22,317,275 | 24.12 | ..... | ..... | ... | 425 | 219,849 | 23.09 | ..... | 145 | 81,481 | ..... |
| Oct. | 45,523 | 24,745,403 | 24.27 | 672 | 438,938 | 29.15 | 691 | 377,319 | 24.38 | 46,886 | 649 | 613,424 | 46,237 |
| Nov. | 58,756 | 30,648,620 | 23.29 | 130 | 85,363 | 29.24 | 379 | 200,270 | 23.58 | 59,265 | 60 | 29,800 | 59,205 |
| Dec. | 44,159 | 23,810,760 | 23.87 | 2,005 | 1,501,336 | 33.43 | 494 | 265,679 | 24.02 | 46,658 | 17 | 20,625 | 46,641 |
| 1947: | | | | | | | | | | | | | |
| Jan. | 92,459 | 51,035,472 | 24.64 | ..... | ..... | .... | 315 | 169,081 | 23.65 | ..... | 20 | 16,644 | ..... |
| Feb. | 57,771 | 30,580,942 | 23.63 | 2,426 | 1,550,499 | 28.52 | 481 | 256,760 | 23.84 | 60,678 | 1,991 | 1,149,953 | 58,687 |
| Mar. | 35,128 | 19,421,550 | 24.46 | 496 | 324,103 | 29.15 | 463 | 246,573 | 23.76 | 36,087 | 39 | 23,592 | 36,048 |
| Apr. | 45,453 | 23,627,600 | 23.21 | 34 | 26,754 | 34.84 | 524 | 282,941 | 24.09 | 46,011 | 26 | 20,725 | 45,985 |
| May | 91,918 | 47,208,658 | 22.93 | 763 | 442,050 | 25.87 | 345 | 186,201 | 24.11 | 93,026 | 14 | 9,169 | 93,012 |
| June | 62,346 | 28,339,739 | 20.29 | 2,825 | 1,642,417 | 25.95 | 554 | 298,705 | 24.07 | 65,725 | 47 | 22,998 | 65,678 |
| July | 56,080 | 22,379,698 | 17.08 | 1,407 | 855,454 | 25.09 | 74 | 27,458 | 16.55 | 57,561 | 421 | 226,777 | 57,140 |
| Aug. | 43,637 | 16,127,766 | 16.93 | 1,784 | 960,877 | 24.48 | 104 | 24,768 | 18.54 | 45,525 | 191 | 118,666 | 45,334 |
| Sept. | 45,724 | 14,589,611 | 14.24 | 516 | 324,206 | 27.12 | 44 | 10,414 | 15.29 | 46,284 | 174 | 95,640 | 46,110 |
| Oct. | 46,898 | 14,819,306 | 13.11 | 3,081 | 1,370,242 | 19.85 | .... | ..... | .... | 49,979 | 134 | 64,620 | 49,665 |
| Nov. | 48,952 | 16,962,935 | 15.46 | 1,994 | 1,042,644 | 23.13 | .... | ..... | .... | 50,946 | 514 | 289,752 | 50,432 |
| Dec. | 69,158 | 24,458,323 | 15.21 | 2,438 | 1,280,834 | 23.45 | .... | ..... | .... | 71,596 | 371 | 215,958 | 71,225 |
| 1948: | | | | | | | | | | | | | |
| Jan. | 76,723 | 29,782,199 | 17.33 | 4,130 | 2,044,850 | 22.11 | .... | ..... | .... | 117,906 | 334 | 206,103 | 117,572 |
| Feb. | 51,528 | 21,027,604 | 18.06 | 2,400 | 1,420,676 | 26.43 | 43 | 10,235 | 10.53 | 53,971 | 290 | 170,339 | 53,681 |
| Mar. | 68,848 | 27,902,550 | 18.09 | 3,148 | 1,730,014 | 24.02 | 25 | 6,845 | 10.05 | 72,021 | 467 | 215,156 | 71,554 |
| Apr. | 38,433 | 15,136,536 | 17.35 | 2,284 | 1,260,932 | 24.65 | 30 | 7,076 | 10.53 | 40,747 | 343 | 190,815 | 40,404 |

Source: U. S. Department of Commerce.
Notes: (1) Figures for latex are on a dry weight basis. (2) Figures for re-exports include natural rubber (dry and latex) and guayule.

## Natural Rubber
### (Including Latex and Guayule)
*(All Quantities in Long Tons)*

| Year | New Supply | Consumption | Re-Exports | Stocks On Hand at End of Period |
|---|---|---|---|---|
| 1936 | 488,145 | 575,000 | 12,581 | 223,000 |
| 1937 | 600,479 | 543,600 | 7,902 | 262,204 |
| 1938 | 411,983 | 437,031 | 5,652 | 231,500 |
| 1939 | 499,473 | 592,000 | 13,125 | 125,800 |
| 1940 | 818,243 | 648,500 | 7,060 | 288,864 |
| 1941 | 1,029,007 | 775,000 | 5,376 | 533,344 |
| 1942 | 282,653 | 376,791 | 10,856 | 422,714 |
| 1943 | 55,329 | 317,634 | 20,815 | 139,594 |
| 1944 | 107,834 | 144,113 | 9,665 | 93,650 |
| 1945 | 135,672 | 105,429 | 6,743 | 118,715 |
| 1946 | 400,687 | 277,597 | 4,338 | 237,467 |
| 1947 | 688,354 | 562,661 | 4,101 | 129,038 |
| 1946: | | | | |
| Sept. | 46,122 | 31,123 | 988 | 199,591 |
| Oct. | 36,735 | 35,421 | 106 | 200,799 |
| Nov. | 55,231 | 37,223 | 35 | 218,672 |
| Dec. | 57,620 | 38,802 | 23 | 237,467 |
| 1947: | | | | |
| Jan. | 102,080 | 45,328 | 43 | 294,191 |
| Feb. | 30,318 | 40,983 | 1,253 | 283,479 |
| Mar. | 40,437 | 43,104 | 509 | 280,812 |
| Apr. | 55,976 | 43,818 | 0 | 292,970 |
| May | 12,738 | 43,018 | 0 | 330,960 |
| June | 57,055 | 42,329 | 311 | 345,175 |
| July | 57,243 | 40,389 | 421 | 131,624 |
| Aug. | 44,672 | 47,289 | 191 | 130,040 |
| Sept. | 46,241 | 50,557 | 174 | 122,097 |
| Oct. | 49,340 | 57,286 | 314 | 114,115 |
| Nov. | 50,840 | 52,076 | 514 | 110,752 |
| Dec. | 71,414 | 56,284 | 371 | 129,038 |
| 1948: | | | | |
| Jan. | 80,564 | 58,174 | 334 | 136,227 |
| Feb. | 54,418 | 51,012 | 290 | 148,081 |
| Mar. | 72,070 | 54,444 | 467 | 130,295 |
| Apr. | 40,947 | 50,616 | 343 | 123,248 |
| May | 40,544 | 52,277 | 360 | 112,879 |

Source: 1936-40, U. S. Department of Commerce; 1941 to date, Rubber Division, OMD, and Predecessor Agencies.

## U.S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.
*(All Quantities in Long Tons)*

| | Balata | | Jelutong | | Gutta-Percha & Other Guttas | |
|---|---|---|---|---|---|---|
| Year | Tons | Value | Tons | Value | Tons | Value |
| 1936 | 535 | 199,368 | 6,163 | 1,296,364 | 1,568 | 555,643 |
| 1937 | 354 | 151,344 | 7,109 | 2,017,786 | 1,122 | 440,894 |
| 1938 | 509 | 181,140 | 9,132 | 2,944,504 | 444 | 204,582 |
| 1939 | 694 | 265,553 | 6,640 | 1,603,418 | 1,740 | 539,255 |
| 1940 | 648 | 300,500 | 7,451 | 2,449,137 | 2,340 | 1,004,885 |
| 1941 | 924 | 489,514 | 8,821 | 2,954,001 | 1,783 | 607,025 |
| 1942 | 1,544 | 1,107,059 | 1,200 | 530,296 | 804 | 525,763 |
| 1943 | 1,047 | 708,701 | 35 | 14,840 | .... | ..... |
| 1944 | 1,012 | 660,805 | 88 | 45,578 | 10 | 4,999 |
| 1945 | 1,361 | 907,253 | .... | ..... | 36 | 21,970 |
| 1946 | 2,281 | 2,233,065 | 304 | 256,169 | 423 | 458,064 |
| 1947 | 1,982 | 2,276,531 | 2,878 | 1,496,887 | 392 | 779,591 |
| 1946: | | | | | | |
| Aug. | 234 | 249,380 | .... | ..... | 4 | 13,438 |
| Sept. | 159 | 161,937 | 4 | 9,337 | 23 | 47,147 |
| Oct. | 282 | 367,393 | 21 | 29,307 | 305 | 216,901 |
| Nov. | 152 | 270,379 | 28 | 39,502 | 3 | 10,233 |
| Dec. | 199 | 287,167 | 57 | 41,757 | 26 | 52,096 |
| 1947: | | | | | | |
| Jan. | 183 | 252,580 | 37 | 29,087 | 36 | 71,252 |
| Feb. | 270 | 300,828 | 36 | 44,629 | 17 | 39,679 |
| Mar. | 137 | 158,530 | 190 | 112,132 | 21 | 28,898 |
| Apr. | 85 | 106,783 | 178 | 86,923 | 31 | 48,178 |
| May | 212 | 208,440 | 524 | 259,745 | 86 | 164,611 |
| June | 76 | 63,612 | 83 | 37,314 | 47 | 88,420 |
| July | 19 | 24,444 | 287 | 122,677 | 22 | 50,204 |
| Aug. | 151 | 159,338 | 143 | 78,357 | 19 | 46,667 |
| Sept. | 86 | 120,633 | 408 | 192,352 | 18 | 120,633 |
| Oct. | 210 | 389,245 | 352 | 187,255 | 35 | 88,776 |
| Nov. | 290 | 302,164 | 148 | 106,443 | 15 | 53,202 |
| Dec. | 172 | 189,934 | 412 | 240,023 | 42 | 77,371 |
| 1948: | | | | | | |
| Jan. | 56 | 35,973 | 481 | 289,506 | 69 | 94,854 |
| Feb. | 145 | 90,023 | 307 | 209,015 | 66 | 84,839 |
| Mar. | 283 | 189,933 | 436 | 271,314 | 51 | 101,691 |
| Apr. | 82 | 36,570 | 651 | 393,280 | 52 | 68,366 |

Source: U. S. Department of Commerce.

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## Synthetic Rubber—Totals

### (GR-S, Neoprene, Butyl, and Buna N Types)

*(All Quantities in Long Tons)*

| Year | Production | Imports | Consumption | Exports | Stocks On Hand at End of Period |
|---|---|---|---|---|---|
| 1941 | 8,383 | ..... | 6,259 | 572 | 1,702 |
| 1942 | 22,434 | ..... | 17,651 | 1,419 | 4,612 |
| 1943 | 231,722 | ..... | 170,891 | 18,148 | 41,568 |
| 1944 | 762,630 | 11,043 | 566,670 | 104,266 | 142,927 |
| 1945 | 820,373 | 10,407 | 693,580 | 83,778 | 203,454 |
| 1946 | 740,026 | 7,709 | 761,699* | 72,920 | 114,963 |
| 1947 | 508,702 | 1,093 | 559,566 | 11,385 | 62,366 |
| 1947: | | | | | |
| Mar. | 57,478 | 0 | 55,514 | 704 | 121,322 |
| Apr. | 50,117 | 4 | 54,333 | 357 | 116,829 |
| May | 39,069 | 0 | 48,692 | 433 | 105,291 |
| June | 35,681 | 0 | 42,580 | 2,286 | 97,612 |
| July | 31,917 | 0 | 37,607 | 412 | 97,728 |
| Aug. | 32,901 | 0 | 39,001 | 585 | 91,288 |
| Sept. | 30,518 | 0 | 41,865 | 343 | 79,246 |
| Oct. | 33,834 | 0 | 45,668 | 194 | 67,379 |
| Nov. | 37,825 | 634 | 39,091 | 188 | 67,871 |
| Dec. | 38,134 | 455 | 43,230 | 358 | 62,366 |
| 1948: | | | | | |
| Jan. | 39,428 | 1,121 | 43,003 | 416 | 60,290 |
| Feb. | 39,025 | 1,318 | 35,375 | 428 | 65,649 |
| Mar. | 43,940 | 1,769 | 38,222 | 383 | 72,885 |
| Apr. | 40,846 | ..... | 34,632 | 563 | 78,722 |
| May | 42,866 | ..... | 35,388 | 350 | 85,950 |

Source: Rubber Division, OMD, and Predecessor Agencies.
Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures shown include the output of both government and privately-owned plants. (3) Figures for 1941 are estimated. * Includes year-end adjustment of 5,384 tons to cover non-reporting companies.

## Synthetic Rubber—By Type

*(All Quantities in Long Tons)*

### New Supply

| | GR-S (Buna S) | GR-M (Neoprene) | GR-I (Butyl) | Buna N Types | Total |
|---|---|---|---|---|---|
| 1942 | 3,721 | 8,956 | 23 | 9,734 | 22,434 |
| 1943 | 182,259 | 33,603 | 1,373 | 14,487 | 231,722 |
| 1944 | 679,949 | 56,660 | 20,252 | 16,812 | 773,673 |
| 1945 | 724,859 | 45,672 | 52,378 | 7,871 | 830,780 |
| 1946 | 613,408 | 47,766 | 80.823 | 5,738 | 747,735 |
| 1947 | 408,858 | 31,495 | 62,824 | 6,618 | 509,795 |

### Consumption

| | | | | | |
|---|---|---|---|---|---|
| 1942 | 2,579 | 6,833 | 22 | 8,217 | 17,651 |
| 1943 | 131,977 | 26,205 | 304 | 12,405 | 170,891 |
| 1944 | 495,552 | 46,243 | 10,763 | 14,112 | 566,670 |
| 1945 | 600,145 | 42,394 | 43,012 | 8,029 | 693,580 |
| 1946 | 632,126 | 44,357 | 79,228 | 5,988 | 761,699 |
| 1947 | 448,589 | 37,703 | 68,838 | 4,536 | 559,666 |

### Exports

| | | | | | |
|---|---|---|---|---|---|
| 1942 | 222 | 1,037 | .... | 160 | 1,419 |
| 1943 | 14,937 | 2,540 | 46 | 631 | 18,148 |
| 1944 | 98,380 | 4,799 | 530 | 557 | 104,266 |
| 1945 | 76,555 | 5,837 | 980 | 406 | 83,778 |
| 1946 | 68,763 | 2,642 | 495 | 1,020 | 72,920 |
| 1947 | 7,951 | 2,617 | 62 | 755 | 11,385 |

### Stocks at End of Period

| | | | | | |
|---|---|---|---|---|---|
| 1942 | 1,050 | 1,786 | 4 | 1,772 | 4,612 |
| 1943 | 30,975 | 6,415 | 1,035 | 3,143 | 41,568 |
| 1944 | 116,130 | 11,739 | 9,892 | 5,166 | 142,927 |
| 1945 | 170,571 | 9,703 | 18,378 | 4,802 | 203,454 |
| 1946 | 81,483 | 10,470 | 19,478 | 3,532 | 114,963 |
| 1947 | 40,606 | 5,237 | 13,184 | 3,339 | 62,366 |

Source: Rubber Division, OMD, and Predecessor Agencies.
Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (2) Figures for GR-M and Buna N Types include production of privately-owned plants.

## Gasoline Consumption

*(In Thousands of Barrels of 42 Gallons)*

| | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|---|---|---|
| Jan. | 46,190 | 49,216 | 36,085 | 47,540 | 52,008 | 51,746 | 57,057 | 61,308 |
| Feb. | 42,782 | 42,666 | 36,274 | 47,754 | 48,856 | 47,654 | 50,551 | 56,487 |
| Mar. | 49,572 | 50,820 | 41,586 | 52,263 | 55,364 | 56,703 | 59,947 | 68,171 |
| Apr. | 55,879 | 49,554 | 48,177 | 50,005 | 59,024 | 62,111 | 64,140 | 72,183 |
| May | 60,121 | 53,212 | 49,828 | 54,230 | 60,748 | 66,800 | 70,865 | ..... |
| June | 59,062 | 50,077 | 52,325 | 54,266 | 60,580 | 63,247 | 71,329 | ..... |
| July | 63,906 | 54,606 | 49,867 | 55,119 | 66,170 | 69,076 | 73,441 | ..... |
| Aug. | 63,575 | 48,793 | 51,880 | 55,618 | 70,058 | 66,729 | 72,089 | ..... |
| Sept. | 59,768 | 50,093 | 49,707 | 56,318 | 64,529 | 62,268 | 71,384 | ..... |
| Oct. | 58,412 | 50,094 | 53,111 | 53,154 | 55,708 | 66,637 | 73,277 | ..... |
| Nov. | 54,670 | 50,729 | 50,703 | 54,967 | 53,543 | 61,345 | 64,158 | ..... |
| Dec. | 53,568 | 39,250 | 48,695 | 52,250 | 49,745 | 61,101 | 67,285 | ..... |
| Total | 667,505 | 589,110 | 568,238 | 633,482 | 696,333 | 735,417 | 795,535 | ..... |

Source: U. S. Bureau of Mines.

## Reclaimed Rubber

### (Including Natural and Synthetic)

*(All Quantities in Long Tons)*

| Year | Production | Consumption Tons | Consumption % to Crude [a] | Exports | Stocks On Hand at End of Period |
|---|---|---|---|---|---|
| 1936 | 150,571 | 141,486 | 24.6 | 7,085 | 19,000 |
| 1937 | 185,033 | 162,000 | 29.8 | 13,233 | 28,800 |
| 1938 | 122,400 | 120,800 | 27.6 | 7,403 | 23,000 |
| 1939 | 186,000 | 170,000 | 28.7 | 12,611 | 25,250 |
| 1940 | 208,971 | 190,244 | 29.3 | 11,347 | 32,636 |
| 1941 | 274,202 | 251,231 | 32.2 | 13,851 | 41,750 |
| 1942 | 286,007[b] | 254,820 | 64.6 | 30,405 | 42,532 |
| 1943 | 304,058[c] | 291,082 | 59.6 | 15,678 | 46,201 |
| 1944 | 260,631[d] | 251,083 | 35.3 | 11,800 | 43,832 |
| 1945 | 243,309 | 241,036 | 30.2 | 13,413 | 28,155 |
| 1946 | 295,612 | 275,410 | 26.5 | 14,461 | 33,666 |
| 1947 | 291,395 | 288,395 | 24.8 | 14,556 | 35,943 |
| 1946: | | | | | |
| Dec. | 25,254 | 23,597 | 25.6 | 1,507 | 33,666 |
| 1947: | | | | | |
| Jan. | 25,545 | 27,715 | 26.6 | 1,443 | 30,053 |
| Feb. | 23,990 | 25,484 | 27.3 | 1,142 | 27,417 |
| Mar. | 26,209 | 26,157 | 26.8 | 1,268 | 31,940 |
| Apr. | 26,696 | 25,066 | 25.5 | 1,073 | 33,527 |
| May | 25,408 | 21,908 | 23.1 | 1,271 | 37,145 |
| June | 24,144 | 21,283 | 25.0 | 1,200 | 39,598 |
| July | 21,252 | 20,433 | 26.8 | 1,052 | 39,704 |
| Aug. | 21,658 | 21,093 | 24.4 | 1,414 | 40,130 |
| Sept. | 22,561 | 23,801 | 25.6 | 902 | 38,461 |
| Oct. | 25,648 | 26,735 | 26.3 | 1,016 | 36,643 |
| Nov. | 23,145 | 23,425 | 25.7 | 1,339 | 36,347 |
| Dec. | 25,123 | 25,229 | 25.4 | 1,437 | 35,943 |
| 1948: | | | | | |
| Jan. | 25,634 | 25,885 | 25.5 | 768 | 36,307 |
| Feb. | 23,678 | 22,374 | 25.9 | 1,273 | 38,444 |
| Mar. | 24,089 | 24,362 | 26.0 | 937 | 38,313 |
| Apr. | 21,802 | 22,322 | 26.2 | 1,049 | 37,946 |
| May | 21,195 | 22,188 | 25.3 | 1,000 | 36,885 |

Source: 1936-40, Department of Commerce; 1941 to date, Rubber Division, OMD, and Predecessor Agencies.
Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (a) Includes natural and synthetic rubber. (b) Includes 893 tons of imports. (c) Includes 67 tons of imports. (d) Includes 21 tons of imports.

## Automobile Production in U. S.

### (Civilian Production Only)

| Year | Passenger Cars | Trucks | Total | Year | Passenger Cars | Trucks | Total |
|---|---|---|---|---|---|---|---|
| 1930 | 2,784,745 | 571,241 | 3,355,986 | 1939 | 2,866,796 | 704,308 | 3,571,104 |
| 1931 | 1,973,090 | 416,648 | 2,389,738 | 1940 | 3,692,328 | 721,637 | 4,413,965 |
| 1932 | 1,135,491 | 235,187 | 1,370,678 | 1941 | 3,744,500 | 875,381 | 4,619,681 |
| 1933 | 1,573,512 | 346,545 | 1,920,057 | 1942 | 220,814 | 133,083 | 353,897 |
| 1934 | 2,177,919 | 575,192 | 2,753,111 | 1943 | 0 | 4,501 | 4,501 |
| 1935 | 3,252,244 | 694,690 | 3,946,934 | 1944 | 0 | 124,819 | 124,819 |
| 1936 | 3,669,528 | 781,862 | 4,451,390 | 1945 | 83,792 | 313,643 | 397,435 |
| 1937 | 3,915,889 | 892,382 | 4,808,271 | 1946 | 2,148,699 | 930,760 | 3,079,459 |
| 1938 | 2,000,985 | 485,852 | 2,486,837 | 1947 | 3,558,178 | 1,220,634 | 4,778,812 |
| 1947: | | | | | | | |
| Jan. | 246,605 | 99,818 | 346,423 | July | 279,631 | 97,814 | 377,445 |
| Feb. | 267,015 | 105,042 | 372,057 | Aug. | 261,158 | 86,509 | 347,667 |
| Mar. | 301,525 | 118,234 | 419,759 | Sept. | 307,942 | 110,720 | 418,662 |
| Apr. | 314,765 | 106,984 | 421,749 | Oct. | 315,969 | 118,365 | 434,334 |
| May | 284,357 | 96,430 | 380,787 | Nov. | 305,148 | 87,611 | 392,759 |
| June | 307,124 | 91,810 | 398,934 | Dec. | 366,939 | 101,569 | 468,508 |
| 1948: | | | | | | | |
| Jan. | 305,081 | 99,200 | 404,281 | July | ..... | ..... | ..... |
| Feb. | 274,847 | 107,054 | 381,901 | Aug. | ..... | ..... | ..... |
| Mar. | 349,998 | 140,606 | 490,604 | Sept. | ..... | ..... | ..... |
| Apr. | 308,071 | 128,963 | 437,034 | Oct. | ..... | ..... | ..... |
| May | 284,357 | 96,430 | 380,787 | Nov. | ..... | ..... | ..... |
| June | ..... | ..... | ..... | Dec. | ..... | ..... | ..... |

Source: Automobile Manufacturers Association.
Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

## Rim Production

| | 1943 | 1944 | 1945 | 1946 | 1947 |
|---|---|---|---|---|---|
| Passenger Car | 780,291 | 1,748,917 | 4,504,368 | 15,058,469 | 21,346,004 |
| Truck & Bus | 4,949,004 | 6,391,441 | 6,486,652 | 5,939,244 | 7,737,353 |
| Agricultural | 301,997 | 997,301 | 1,441,909 | 1,735,992 | 2,633,699 |
| Earth Mover | 945 | 703 | 1,308 | 5,520 | 10,610 |
| Total | 6,032,237 | 9,138,362 | 12,434,237 | 22,739,225 | 31,727,666 |

| | 1947 | | | 1948 | | |
|---|---|---|---|---|---|---|
| | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. |
| Passenger Car | 2,225,026 | 1,771,961 | 1,967,503 | 2,032,210 | 1,683,295 | 2,003,878 |
| Truck & Bus | 725,182 | 521,230 | 651,273 | 584,095 | 601,940 | 759,794 |
| Agricultural | 236,717 | 228,308 | 266,690 | 231,049 | 196,894 | 335,565 |
| Earth Mover | 1,730 | 1,210 | 586 | 1,710 | 1,479 | 1,336 |
| Total | 3,188,655 | 2,522,709 | 2,886,052 | 2,849,064 | 2,483,608 | 3,100,573 |

Source: The Tire & Rim Association, Inc.

# Stamford

## "Factice" Vulcanized Oil

(REG. U. S. PAT. OFF.)

Our products are engineered to fill every need in natural and synthetic rubber compounding wherever the use of vulcanized oil is indicated.

We point with pride not only to a complete line of solid Brown, White, "Neophax" and "Amberex" grades, but also our aqueous dispersions and hydro-carbon solutions of "Factice" for use in their appropriate compounds.

Continuing research and development in our laboratory and rigid production control has made us the leader in this field.

The services of our laboratory are at your disposal in solving your compounding problems.

THE STAMFORD RUBBER SUPPLY CO.
STAMFORD, CONN.
Makers of Stamford "Factice" Vulcanized Oil Since 1900
(REG. U. S. PAT. OFF.)

# Crystex

## INSOLUBLE SULPHUR

Stauffer CHEMICALS SINCE 1885

CRYSTEX (Insoluble Sulphur) preserves tack in uncured natural rubber and synthetic stocks. It does not bloom, and is especially useful in tire carcass stocks, and in camel back. Improved cures may be expected when CRYSTEX replaces ordinary sulphur in some compounds.

CRYSTEX has been found useful in some cements, and in compounding latices for dipping baths. Due to improved and expanded manufacturing facilities, CRYSTEX now costs less and is more practical than ever in Rubbermakers' processes.

Commercial Rubbermakers' Sulphur, Tire Brand, 99.5% Pure — Refined Rubbermakers' Sulphur, Tube Brand, 100% Pure —"Conditioned" Rubbermakers' Sulphur — Carbon Tetrachloride — Carbon Bisulphide — Caustic Soda — Sulphur Chloride.

## STAUFFER CHEMICAL CO.

420 Lexington Avenue, New York 17, N. Y.
221 North LaSalle Street, Chicago 1, Illinois
424 Ohio Bldg., Akron 8, Ohio—Apopka, Fla.
555 South Flower Street, Los Angeles 13, Cal.
636 California Street, San Francisco 8, Cal.
North Portland, Oregon—Houston 2, Texas

## Automotive Pneumatic Casings

*(Thousands of Units)*

| | Shipments | | | | | |
|---|---|---|---|---|---|---|
| | Original Equipment | Replacement | Export | Total | Production | Inventory End of Period |
| 1936 (total) .... | 21,446 | 30,866 | 1,073 | 53,385 | 56,041 | 10,717 |
| Passenger Car. | 18,941 | 26,999 | 644 | 46,584 | 49,013 | 9,291 |
| Truck and Bus | 2,505 | 3,867 | 429 | 6,801 | 7,028 | 1,426 |
| 1937 (total) .... | 22,353 | 29,886 | 1,246 | 53,485 | 53,310 | 10,383 |
| Passenger Car. | 20,055 | 26,177 | 696 | 46,928 | 46,497 | 8,745 |
| Truck and Bus | 2,298 | 3,709 | 550 | 6,557 | 6,813 | 1,638 |
| 1938 (total) .... | 11,516 | 30,567 | 1,049 | 43,132 | 40,907 | 8,451 |
| Passenger Car. | 10,086 | 27,104 | 580 | 37,770 | 35,789 | 6,937 |
| Truck and Bus | 1,430 | 3,463 | 469 | 5,362 | 5,118 | 1,514 |
| 1939 (total) .... | 18,208 | 38,022 | 1,279 | 57,509 | 57,613 | 8,665 |
| Passenger Car. | 15,742 | 33,471 | 607 | 49,820 | 49,933 | 7,108 |
| Truck and Bus | 2,466 | 4,551 | 672 | 7,689 | 7,680 | 1,557 |
| 1940 (total) .... | 22,252 | 35,346 | 1,176 | 58,774 | 59,186 | 9,127 |
| Passenger Car. | 19,560 | 30,903 | 411 | 50,874 | 50,965 | 7,270 |
| Truck and Bus | 2,692 | 4,443 | 765 | 7,900 | 8,221 | 1,857 |
| 1941 (total) .... | 24,780 | 39,895 | 1,489 | 66,164 | 61,540 | 4,436 |
| Passenger Car. | 19,855 | 34,119 | 586 | 54,560 | 50,392 | 3,165 |
| Truck and Bus | 4,925 | 5,776 | 903 | 11,604 | 11,148 | 1,271 |
| 1942 (total) .... | 6,680 | 8,872 | 207 | 15,759 | 15,351 | 6,247 |
| Passenger Car. | 910 | 2,734 | 38 | 3,682 | 2,790 | 4,432 |
| Truck and Bus | 5,770 | 6,138 | 169 | 12,077 | 12,561 | 1,815 |
| 1943 (total) .... | 6,128 | 18,547 | 225 | 24,900 | 20,423 | 1,883 |
| Passenger Car. | 82 | 10,606 | 71 | 10,759 | 7,620 | 1,132 |
| Truck and Bus | 6,046 | 7,941 | 154 | 14,141 | 12,803 | 751 |
| 1944 (total) .... | 6,654 | 26,439 | 263 | 33,356 | 33,446 | 2,013 |
| Passenger Car. | 208 | 18,330 | 130 | 18,668 | 18,819 | 1,218 |
| Truck and Bus | 6,446 | 8,109 | 133 | 14,688 | 14,627 | 795 |
| 1945 (total) .... | 5,984 | 36,479 | 504 | 42,967 | 44,524 | 3,077 |
| Passenger Car. | 1,115 | 25,463 | 222 | 26,800 | 28,200 | 2,214 |
| Truck and Bus | 4,869 | 11,016 | 282 | 16,167 | 16,324 | 863 |
| 1946 (total) .... | 15,310 | 65,490 | 1,512 | 82,312 | 82,298 | 2,448 |
| Passenger Car. | 11,086 | 54,684 | 653 | 66,423 | 66,466 | 1,763 |
| Truck and Bus | 4,224 | 10,806 | 859 | 15,889 | 15,832 | 685 |
| 1947 (total) .... | 25,055 | 62,890 | 3,249 | 91,194 | 95,548 | 6,975 |
| Passenger Car. | 19,644 | 52,865 | 1,608 | 74,117 | 77,790 | 5,470 |
| Truck and Bus | 5,411 | 10,025 | 1,642 | 17,077 | 17,758 | 1,505 |
| 1948: | | | | | | |
| Jan. (total) .... | 2,340 | 3,433 | 157 | 5,919 | 7,851 | 8,806 |
| Passenger Car. | 1,865 | 2,805 | 67 | 4,737 | 6,439 | 7,074 |
| Truck and Bus | 465 | 628 | 90 | 1,182 | 1,412 | 1,731 |
| Feb. (total) .... | 2,020 | 2,887 | 200 | 5,106 | 6,385 | 10,172 |
| Passenger Car. | 1,578 | 2,351 | 88 | 4,017 | 5,110 | 8,231 |
| Truck and Bus | 442 | 536 | 111 | 1,090 | 1,276 | 1,941 |
| Mar. (total) .... | 2,366 | 3,138 | 154 | 5,658 | 6,930 | 11,364 |
| Passenger Car. | 1,861 | 2,644 | 51 | 4,556 | 5,666 | 9,304 |
| Truck and Bus | 505 | 539 | 102 | 1,146 | 1,264 | 2,059 |
| Apr. (total) .... | 2,265 | 4,632 | 142 | 7,039 | 6,574 | 10,940 |
| Passenger Car. | 1,765 | 4,032 | 55 | 5,852 | 5,373 | 8,858 |
| Truck and Bus | 500 | 599 | 87 | 1,186 | 1,201 | 2,082 |

Source: The Rubber Manufacturers Association, Inc.

## Cotton, Rayon and Nylon Tire Fabrics

*(Production in Thousands of Pounds)*

| | Cotton | | | | Rayon and Nylon [b] | | |
|---|---|---|---|---|---|---|---|
| | Tire Cord Not Woven | Cord Fabric Woven | Chafer and All Other Tire Fabrics | Total | Tire Cord Not Woven | Tire Cord And Other Tire Fabrics | Total |
| 1945: | | | | | | | |
| Jan.-Mar. | 16,671 | 43,835 | 12,306 | 72,812 | 3,726 | 37,777 | 41,503 |
| Apr.-June | 16,044 | 42,383 | 13,604 | 72,031 | 4,064 | 42,476 | 46,540 |
| July-Sept. | 15,136 | 38,158 | 14,122 | 67,416 | 3,549 | 42,606 | 46,155 |
| Oct.-Dec. | 15,514 | 36,442 | 13,573 | 65,529 | a | 47,734 | 47,734 |
| Total | 63,365 | 160,818 | 53,605 | 277,788 | 11,339 | 170,593 | 181,932 |
| 1946: | | | | | | | |
| Jan.-Mar. | 17,128 | 39,377 | 15,245 | 71,750 | a | 51,208 | 51,208 |
| Apr.-June | 19,622 | 40,197 | 18,623 | 78,442 | a | 52,511 | 52,511 |
| July-Sept. | 17,279 | 39,259 | 18,787 | 75,325 | 5,102 | 46,932 | 52,034 |
| Oct.-Dec. | 20,660 | 42,668 | 21,708 | 85,036 | 5,858 | 50,589 | 56,447 |
| Total | 74,689 | 161,501 | 74,363 | 310,553 | 10,960 | 201,240 | 212,200 |
| 1947: | | | | | | | |
| Jan.-Mar. | 21,972 | 49,377 | 21,815 | 93,164 | 5,322 | 52,059 | 57,381 |
| Apr.-June | 23,491 | 53,746 | 16,480 | 93,717 | 5,486 | 47,360 | 52,846 |
| July-Sept. | 15,571 | 44,291 | 14,596 | 74,458 | 6,161 | 51,719 | 57,880 |
| Oct.-Dec. | 18,183 | 48,532 | 17,762 | 84,477 | 6,550 | 55,078 | 61,628 |
| Total | 79,217 | 195,946 | 70,653 | 345,816 | 23,519 | 206,216 | 229,735 |
| 1948: | | | | | | | |
| Jan.-Mar. | 18,546 | 50,251 | 19,391 | 88,188 | a | 60,569 | 60,569 |
| Apr.-June | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| July-Sept. | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Oct.-Dec. | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Total | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

Source: U. S. Bureau of the Census.

Notes: (a) Included with tire cord and fabrics to avoid disclosures of operations of individual mills. (b) Fuel cell fabrics are not included with rayon and nylon tire cord and fabrics.

## Automotive Inner Tubes

*(Thousands of Units)*

| | Shipments | | | | | |
|---|---|---|---|---|---|---|
| | Original Equipment | Replacement | Export | Total | Production | Inventory End of Period |
| 1936 ..... | 21,514 | 32,188 | 721 | 54,423 | 57,036 | 10,945 |
| 1937 ..... | 22,464 | 29,554 | 749 | 52,767 | 52,373 | 10,312 |
| 1938 ..... | 11,515 | 28,134 | 644 | 40,293 | 37,848 | 8,166 |
| 1939 ..... | 18,190 | 31,998 | 1,002 | 51,190 | 50,649 | 7,036 |
| 1940 ..... | 22,172 | 29,070 | 972 | 52,214 | 52,237 | 7,017 |
| 1941 ..... | 24,722 | 33,749 | 1,232 | 59,703 | 57,433 | 4,686 |
| 1942 ..... | n.a. | n.a. | n.a. | 13,958 | 12,568 | 5,742 |
| 1943 ..... | 6,183 | 12,373 | 176 | 18,732 | 15,260 | 2,584 |
| 1944 ..... | 6,461 | 19,739 | 190 | 26,390 | 26,750 | 2,823 |
| 1945 ..... | 6,119 | 33,161 | 408 | 39,688 | 41,102 | 3,671 |
| 1946 ..... | 15,327 | 59,357 | 1,424 | 76,108 | 77,251 | 3,820 |
| 1947 ..... | 25,039 | 49,107 | 2,496 | 76,641 | 75,509 | 8,089 |
| 1947: | | | | | | |
| Nov. ..... | 2,092 | 4,124 | 126 | 6,343 | 6,456 | 6,682 |
| Dec. ..... | 2,334 | 2,873 | 117 | 5,324 | 6,544 | 8,089 |
| 1948: | | | | | | |
| Jan. ..... | 2,327 | 2,745 | 81 | 5,152 | 6,226 | 9,116 |
| Feb. ..... | 2,019 | 2,382 | 104 | 4,505 | 4,980 | 9,657 |
| Mar. ..... | 2,363 | 2,731 | 94 | 5,188 | 5,534 | 9,930 |
| Apr. ..... | 2,264 | 3,456 | 88 | 5,807 | 5,578 | 9,737 |

Source: The Rubber Manufacturers Association, Inc.
n.a.—Not available.

## Smoked Sheets—Spot Closing Prices

*(New York Market—Cents per pound)*

| Year | High | Low | Avg. | Year | High | Low | Avg. |
|---|---|---|---|---|---|---|---|
| 1910 | 288 | 141 | 206.60 | 1929 | 26¾ | 15½ | 20.55 |
| 1911 | 184 | 114 | 141.30 | 1930 | 16½ | 7½ | 11.98 |
| 1912 | 140 | 108 | 121.60 | 1931 | 8⅝ | 4¼ | 6.17 |
| 1913 | 113 | 59 | 82.04 | 1932 | 4¾ | 2½ | 3.49 |
| 1914 | 93 | 56 | 65.33 | 1933 | 9⅞ | 2⅜ | 5.96 |
| 1915 | 79 | 58½ | 65.85 | 1934 | 15⅜ | 8¼ | 12.92 |
| 1916 | 102 | 55 | 72.50 | 1935 | 13¾ | 10½ | 12.37 |
| 1917 | 90 | 52 | 72.23 | 1936 | 23 | 13½ | 16.41 |
| 1918 | 70 | 40 | 60.15 | 1937 | 26¾ | 14 | 19.39 |
| 1919 | 57 | 38½ | 48.70 | 1938 | 17⅞ | 10¼ | 14.64 |
| 1920 | 56½ | 16 | 36.30 | 1939 | 24 | 14⅜ | 17.57 |
| 1921 | 21¾ | 11½ | 16.36 | 1940 | 24 | 18¼ | 20.10 |
| 1922 | 28⅜ | 13⅜ | 17.50 | 1941 | 24⅞ | 19⅛ | 22.40 |
| 1923 | 37½ | 24¾ | 29.45 | 1942 | 22½ | 22½ | 22.50 |
| 1924 | 40⅝ | 17¾ | 26.20 | 1943 | 22½ | 22½ | 22.50 |
| 1925 | 121 | 34¾ | 72.46 | 1944 | 22½ | 22½ | 22.50 |
| 1926 | 88½ | 36¾ | 48.50 | 1945 | 22½ | 22½ | 22.50 |
| 1927 | 41¾ | 33 | 37.72 | 1946 | 22½ | 22½ | 22.50 |
| 1928 | 41¼ | 17 | 22.48 | 1947 | 25 | 14 | 20.00 |

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947.

## Spot Closing Cotton Prices

*(Middling Upland Grade—New York Market—in Cents)*

### Average Monthly Price Per Pound

| | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|---|---|---|
| Jan. | 10.66 | 19.85 | 21.34 | 20.76 | 22.36 | 25.49 | 32.58 | 36.09 |
| Feb. | 10.87 | 20.05 | 21.61 | 21.34 | 22.29 | 26.57 | 33.91 | 33.63 |
| Mar. | 11.08 | 20.42 | 21.98 | 21.65 | 22.43 | 27.52 | 35.89 | 35.04 |
| Apr. | 11.48 | 21.10 | 22.02 | 21.71 | 21.88 | 28.40 | 35.89 | 38.10 |
| May | 12.97 | 20.88 | 21.97 | 21.63 | 23.30 | 28.17 | 36.51 | 38.57 |
| June | 14.66 | 19.78 | 21.92 | 23.31 | 23.42 | 29.89 | 37.83 | 38.12 |
| July | 16.55 | 20.27 | 21.46 | 22.33 | 23.27 | 34.11 | 38.03 | .... |
| Aug. | 17.06 | 19.45 | 21.09 | 22.11 | 23.10 | 36.31 | 34.83 | .... |
| Sept. | 17.94 | 19.62 | 21.10 | 22.10 | 23.25 | 37.59 | 32.21 | .... |
| Oct. | 17.31 | 19.79 | 21.00 | 22.32 | 23.85 | 36.79 | 32.39 | .... |
| Nov. | 17.21 | 20.21 | 20.32 | 22.13 | 24.71 | 31.50 | 34.50 | .... |
| Dec. | 18.09 | 20.55 | 20.32 | 22.28 | 25.21 | 33.03 | 36.74 | .... |
| Average for Year | 14.66 | 20.16 | 21.34 | 21.89 | 23.25 | 31.28 | 35.11 | .... |

## Consumption of Vinyl Resins

*(In Thousands of Pounds)*

| | Sheeting and Film [a] | Textile and Paper Coating Resins [b] | Molding and Extrusion Materials [b] | All Other [b, c] |
|---|---|---|---|---|
| 1946 | 52,080 | 11,673 | 61,852 | 27,083 |
| 1947 | 66,430 | 17,237 | 73,114 | 27,064 |
| 1947: | | | | |
| Sept. | 5,790 | 1,194 | 5,788 | 2,354 |
| Oct. | 5,965 | 1,781 | 7,671 | 2,623 |
| Nov. | 7,246 | 1,680 | 5,760 | 2,155 |
| Dec. | 8,094 | 2,183 | 7,829 | 2,298 |
| 1948: | | | | |
| Jan. | 7,785 | 2,414 | 7,823 | 1,531 |
| Feb. | 5,980 | 2,102 | 7,601 | 1,951 |
| Mar. | 7,537 | 3,053 | 6,767 | 1,680 |
| Apr. | 7,468 | 2,938 | 6,725 | 2,066 |

Source: Bureau of the Census.

Notes: (a) Includes weight of fillers, plasticizers, extenders and safety glass sheeting; (b) Resin content; (c) Includes Adhesives, but excludes data for protective coating resins.

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**60% LATEX**
**NORMAL LATEX**

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*Balatas — Gums — Guayule*

*Synthetic Rubber*

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FIRST NATIONAL TOWER
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# HEVEATEX
## CORPORATION
**78 GOODYEAR AVENUE**
**MELROSE 76, MASS.**

BRANCHES: CHICAGO, ILL. AKRON, O. DETROIT, MICH. LOS ANGELES, CAL.

Natural and Synthetic
Latex and Latex Compounds
*for all purposes*

# Rubber Industry Employment, Payrolls, Wages and Hours

## Employment — Thousands of Production Workers and Index (1939 = 100)

| | 1947 | | | | 1948 | | | |
|---|---|---|---|---|---|---|---|---|
| | All Rubber Products | | Rubber Tires & Tubes | | All Rubber Products | | Rubber Tires & Tubes | |
| Month | Number | Index | Number | Index | Number | Index | Number | Index |
| Jan. | 240 | 198.8 | 110 | 235.5 | 223 | 184.2 | 114 | 209.2 |
| Feb. | 240 | 198.2 | 109 | 233.3 | 221 | 182.2 | 112 | 205.8 |
| Mar. | 238 | 196.5 | 108 | 231.4 | 217 | 179.6 | 109 | 200.7 |
| Apr. | 234 | 193.5 | 106 | 227.0 | 212 | 175.6 | ... | .... |
| May | 223 | 184.5 | 102 | 220.0 | ... | .... | ... | .... |
| June | 219 | 180.7 | 118 | 217.0 | ... | .... | ... | .... |
| July | 212 | 175.2 | 115 | 212.3 | ... | .... | ... | .... |
| Aug. | 215 | 177.8 | 117 | 214.9 | ... | .... | ... | .... |
| Sept. | 215 | 178.1 | 113 | 207.5 | ... | .... | ... | .... |
| Oct. | 220 | 182.0 | 114 | 211.0 | ... | .... | ... | .... |
| Nov. | 223 | 184.5 | 115 | 212.2 | ... | .... | ... | .... |
| Dec. | 225 | 186.1 | 115 | 211.7 | ... | .... | ... | .... |

## Payrolls — Production Workers Pay Rolls Unadjusted Index (1939 = 100)

| | 1946 | | 1947 | | 1948 | |
|---|---|---|---|---|---|---|
| Month | All Rubber Products | Rubber Tires & Tubes | All Rubber Products | Rubber Tires & Tubes | All Rubber Products | Rubber Tires & Tubes |
| Jan. | 290.1 | 272.6 | 386.3 | 416.3 | 376.8 | 388.4 |
| Feb. | 292.1 | 271.9 | 385.0 | 413.3 | 388.3 | 355.9 |
| Mar. | 298.2 | 281.1 | 374.3 | 397.3 | 340.8 | 330.2 |
| Apr. | 319.7 | 312.9 | 383.9 | 414.2 | .... | .... |
| May | 322.1 | 314.2 | 367.2 | 399.3 | .... | .... |
| June | 331.4 | 318.3 | 361.9 | 396.1 | .... | .... |
| July | 321.4 | 304.3 | 352.7 | 389.5 | .... | .... |
| Aug. | 336.9 | 311.2 | 357.4 | 396.0 | .... | .... |
| Sept. | 363.9 | 348.9 | 369.0 | 397.9 | .... | .... |
| Oct. | 361.3 | 346.1 | 375.6 | 398.0 | .... | .... |
| Nov. | 377.4 | 360.3 | 383.3 | 407.5 | .... | .... |
| Dec. | 392.2 | 368.9 | 396.5 | 412.1 | .... | .... |

## Wages — Average Weekly Earnings

| | 1946 | | 1947 | | 1948 | |
|---|---|---|---|---|---|---|
| Month | All Rubber Products | Rubber Tires & Tubes | All Rubber Products | Rubber Tires & Tubes | All Rubber Products | Rubber Tires & Tubes |
| Jan. | $46.71 | $50.29 | $54.03 | $59.78 | $57.33 | $62.72 |
| Feb. | 46.05 | 49.21 | 54.06 | 59.90 | 54.70 | 58.22 |
| Mar. | 46.46 | 49.72 | 52.97 | 58.05 | 53.24 | 55.54 |
| Apr. | 49.67 | 54.77 | 55.23 | 61.64 | 53.44 | 56.54 |
| May | 49.82 | 54.72 | 55.30 | 61.12 | .... | .... |
| June | 50.45 | 54.82 | 55.49 | 61.35 | .... | .... |
| July | 50.60 | 56.11 | 55.74 | 62.06 | .... | .... |
| Aug. | 51.03 | 55.42 | 55.92 | 61.15 | .... | .... |
| Sept. | 53.69 | 59.89 | 57.76 | 64.75 | .... | .... |
| Oct. | 51.74 | 57.38 | 57.62 | 63.78 | .... | .... |
| Nov. | 52.93 | 58.87 | 57.99 | 64.86 | .... | .... |
| Dec. | 54.63 | 60.46 | 59.47 | 65.74 | .... | .... |

## Wages — Average Hourly Earnings

| | 1946 | | 1947 | | 1948 | |
|---|---|---|---|---|---|---|
| Month | All Rubber Products | Rubber Tires & Tubes | All Rubber Products | Rubber Tires & Tubes | All Rubber Products | Rubber Tires & Tubes |
| Jan. | $1.121 | $1.255 | $1.330 | $1.511 | $1.444 | $1.646 |
| Feb. | 1.129 | 1.266 | 1.331 | 1.517 | 1.421 | 1.613 |
| Mar. | 1.138 | 1.275 | 1.330 | 1.512 | 1.408 | 1.599 |
| Apr. | 1.232 | 1.414 | 1.397 | 1.608 | 1.413 | 1.603 |
| May | 1.266 | 1.446 | 1.416 | 1.622 | .... | .... |
| June | 1.283 | 1.461 | 1.419 | 1.615 | .... | .... |
| July | 1.292 | 1.472 | 1.445 | 1.640 | .... | .... |
| Aug. | 1.295 | 1.474 | 1.445 | 1.640 | .... | .... |
| Sept. | 1.323 | 1.507 | 1.447 | 1.661 | .... | .... |
| Oct. | 1.313 | 1.492 | 1.436 | 1.644 | .... | .... |
| Nov. | 1.322 | 1.503 | 1.453 | 1.661 | .... | .... |
| Dec. | 1.331 | 1.513 | 1.454 | 1.658 | .... | .... |

## Hours — Average Weekly Hours per Worker

| Month | 1946 | 1947 | 1948 | Month | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|---|---|
| January | 41.7 | 40.6 | 39.7 | July | 39.2 | 38.6 | ... |
| February | 40.8 | 40.6 | 38.5 | August | 39.4 | 38.7 | ... |
| March | 40.8 | 39.8 | 37.8 | September | 40.6 | 39.9 | ... |
| April | 40.3 | 39.5 | 37.8 | October | 39.4 | 40.1 | ... |
| May | 39.4 | 39.0 | ... | November | 40.1 | 39.9 | ... |
| June | 39.3 | 39.1 | ... | December | 41.2 | 40.9 | ... |

Source: U. S. Department of Commerce.

# Indexes of Production, Shipments and Inventory For The Rubber Industry

## Production 1935-1939 = 100 (Based on man-hours)

| Month | 1946 | 1947 | 1948 | Month | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|---|---|
| Jan. | 215 | 247 | 223 | July | 211 | 207 | .... |
| Feb. | 216 | 246 | 215 | Aug. | 221 | 210 | .... |
| Mar. | 221 | 239 | 207 | Sept. | 234 | 217 | .... |
| Apr. | 219 | 234 | 201 | Oct. | 234 | 223 | .... |
| May | 215 | 220 | .... | Nov. | 243 | 225 | .... |
| June | 218 | 216 | .... | Dec. | 252 | 230 | .... |

## Shipments—Average Month 1939 = 100 (Based on $ Value)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Jan. | 211 | 301 | 282 | July | 278 | 298 | .... |
| Feb. | 214 | 326 | 289 | Aug. | 292 | 312 | .... |
| Mar. | 223 | 332 | 252 | Sept. | 321 | 346 | .... |
| Apr. | 291 | 320 | 313 | Oct. | 344 | 348 | .... |
| May | 297 | 309 | .... | Nov. | 324 | 354 | .... |
| June | 302 | 322 | .... | Dec. | 363 | 307 | .... |

## Inventory — Average Month 1939 = 100 (Based on $ Value)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Jan. | 171 | 229 | 271 | July | 187 | 268 | .... |
| Feb. | 177 | 241 | 283 | Aug. | 191 | 258 | .... |
| Mar. | 183 | 253 | 302 | Sept. | 197 | 246 | .... |
| Apr. | 190 | 270 | 325 | Oct. | 204 | 247 | .... |
| May | 188 | 279 | .... | Nov. | 207 | 242 | .... |
| June | 185 | 277 | .... | Dec. | 209 | 257 | .... |

Source: U. S. Department of Commerce.

# Various Compounding Materials Consumed by the Rubber Industry

| Material | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 |
|---|---|---|---|---|---|---|---|
| **Asphalt** [a] | | | | | | | |
| Short tons | 20,536 | 22,263 | 16,510 | 20,189 | 19,483 | 28,715 | ..... |
| % of total | 0.6 | 0.6 | 0.5 | 0.6 | 0.5 | 0.7 | .. |
| **Barite (Barytes):** | | | | | | | |
| Short tons | 9,800 | 6,334 | 8,000 | 10,000 | 10,000 | 20,000 | ..... |
| % of total | 4.2 | 3.6 | 3.9 | 2.9 | 2.1 | 4.4 | .. |
| **Carbon Black:** | | | | | | | |
| Short tons | 219,751 | (147,974 | 236.737 | 369.015 | 402,193 | 470,732 | ..... |
| % of total | 68.2 | 65.8 | 75.2 | 78.7 | 78.9 | 74.1 | .. |
| **Clay, Kaolin:** | | | | | | | |
| Short tons | 127,0555 | 51,334 | 50,964 | 59,588 | 109,936 | 162,393 | 166,201 |
| % of total | 11.6 | 5.1 | 5.5 | 6.8 | 11.7 | 12.3 | 12 |
| **Clay, Fire & Stoneware:** | | | | | | | |
| Short tons | 9,000 | 5,000 | 10,259 | 7,160 | 7,800 | 12,951 | ..... |
| % of total | 0.2 | 0.1 | 0.2 | 0.1 | 0.1 | 0.2 | .. |
| **Lead Sulfate, Basic:** | | | | | | | |
| Short tons | 200 | 89 | 131 | 268 | 200 | ..... | ..... |
| % of total | 1.9 | 1.1 | 2.3 | 4.2 | 5.2 | .. | .. |
| **Lime:** | | | | | | | |
| Short tons | 3,058 | 1,381 | 2,039 | 5,634 | 7,170 | 3,193 | ..... |
| % of total | 0.05 | 0.02 | 0.05 | 0.13 | 0.10 | 0.1 | .. |
| **Litharge:** | | | | | | | |
| Short tons | 3,968 | 3,460 | 4,302 | 3,023 | 1,864 | 2,131 | ..... |
| % of total | 3.3 | 3.8 | 3.8 | 2.2 | 1.3 | 1.6 | .. |
| **Lithopone:** | | | | | | | |
| Short tons | 3,547 | 1,047 | 1,078 | 726 | 977 | 1,607 | ..... |
| % of total | 2.0 | 0.8 | 0.8 | 0.5 | 0.7 | 1.1 | .. |
| **Mica, Ground:** | | | | | | | |
| Short tons | 3,476 | 1,754 | 3,063 | 1,137 | 3,715 | 4,951 | ..... |
| % of total | 8.0 | 3.7 | 6.0 | 2.2 | 7.0 | 8.0 | .. |
| **Sulfur:** | | | | | | | |
| Short tons | 63,000 | 40,000 | 51,000 | 63,000 | 64,960 | 72,800 | ..... |
| % of tgotal | 2.4 | 1.4 | 1.8 | 1.9 | 2.0 | 2.2 | .. |
| **Talc** [b] | | | | | | | |
| Short tons | 58,114 | 40,487 | 48,994 | 51,833 | 63,758* | 65,980 | ..... |
| % of tgotal | 13.9 | 10.0 | 11.8 | 13.0 | 16.0 | 14.4 | .. |
| **Zinc Oxide:** | | | | | | | |
| Short tons | 90,429 | 52,717 | 67,898 | 59,518 | 63,447 | 83,776 | ..... |
| % of total | 63.4 | 53.0 | 47.4 | 42.3 | 49.6 | 53.1 | .. |

([b]) Includes pyrophyllite and ground soapstone. * Revised.
Source: U. S. Bureau of Mines.
Notes: ([a]) Solid and semi-solid products of less than 200 penetration.

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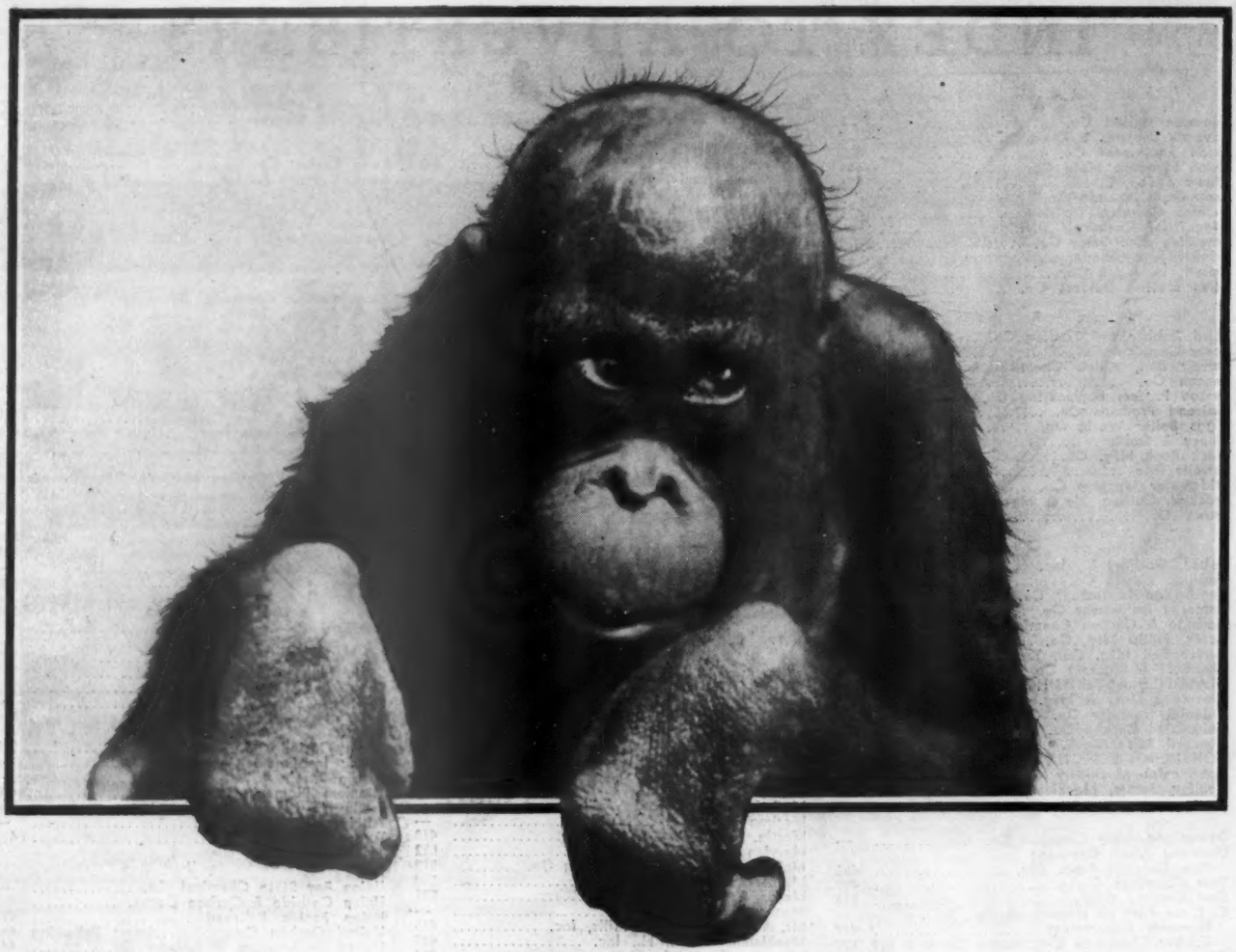

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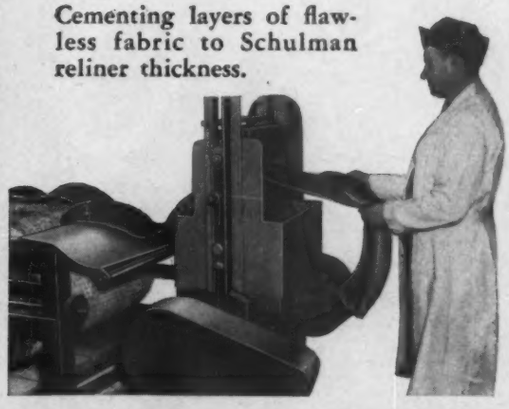

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